STANAG No. 4545, Edition 2
Study Draft 1, 2 February 1998

NORTH ATLANTIC TREATY ORGANISATION
(NATO)

MILITARY AGENCY FOR STANDARDIZATION
(MAS)

STANDARDIZATION AGREEMENT
(STANAG)

SUBJECT: NATO Secondary Imagery Format
Format d' Imagerie Secondaire OTAN

Promulgated on

Chairman, MAS

RECORD OF AMENDMENTS

No.	Reference/date of amendment	Date Entered	Signature

EXPLANATORY NOTES

AGREEMENT

1. This NATO Standardization Agreement (STANAG) is promulgated by the Chairman MAS under the authority vested in him by the NATO Military Committee.

2. No departure may be made from the agreement without consultation with the Custodian. Nations may propose changes at any time to the Custodian where they will be processed in the same manner as the original agreement.

3. Ratifying nations have agreed that national orders, manuals and instructions implementing this STANAG will include a reference to the STANAG number for purposes of identification.

DEFINITIONS

4. "Ratification is "In NATO Standardization, the fulfilment by which a member nation formally accepts, with or without reservation, the content of a Standardization Agreement" (AAP-6).

5. Implementation is "In NATO Standardization, the fulfilment by a member nation of its obligations as specified in a Standardization Agreement" (AAP-6).

6. Reservation is "In NATO Standardization, the stated qualification by a member nation that describes the part of a Standardization Agreement that it will not implement or will implement only with limitations" (AAP-6).

RATIFICATION, IMPLEMENTATION, AND RESERVATIONS

7. Page iii gives the details of ratification and implementation of this agreement. If no details are shown it signifies that the nation has not yet notified the Custodian of its intentions. Page iv (and subsequent) gives details of reservations and proprietary rights that have been stated.

RATIFICATION AND IMPLEMENTATION DETAILS
STADE DE RATIFICATION ET DE MISE EN APPLICATION

NATION	NATIONAL RATIFICATION REFERENCE DE LA RATIFICATION NATIONALE	NATIONAL IMPLEM-ENTING DOCUMENT NATIONAL DE MISE EN APPLICATION	IMPLEMENTATION/MISE EN APPLICATION					
			FORECAST DATE PREVUE			ACTUAL DATE DATE REELLE		
			NAVY MER	ARMY TERRE	AIR	NAVY MER	ARMY TERRE	AIR
	(1)	(2)	(3)	(3)	(3)	(3)	(3)	(3)
BE								
CA								
DA								
FR								
GE								
GR								
IC								
IT								
LU								
NL								
NO								
PO								
SP								
TU								
UK								
US								

• See reservations overleaf/Voir reservés au verso(4)
+ See comments overleaf/Voir commentaires au verso (5)
X Service(s) implementing/Armées mettant en application (7)
Releasable to NACC/PfP □ Non Releasable □ (8)

NATO EFFECTIVE DATE (6)
DATE ↙ ENTREE EN VIGUEUR OTAN

EXPLANATORY NOTES ON RATIFICATION AND IMPLEMENTATION DETAILS

(1) a. One ratifying reference is entered for each nation. All dates are to be shown as follows: "of/du 23.3.81".

b. If a nation has:

(1) Not signified its intentions regarding ratification of the STANAG or an amendment thereto, the space is left blank.

(2) Decided not to ratify the STANAG, the words "NOT RATIFYING/NE RATIFIE PAS' is entered.

(2) List the national implementing document(s); this may be the STANAG itself or an AP.

(3) When nations give a forecast date for their implementation, it is entered in the forecast column (month and year only). Implementation dates are transferred from the forecast to the actual date column when notified by a nation.

(4) Reservations are to be listed as stated by each nation.

(5) If a nation has indicated that it will not implement "NOT IMPLEMENTING/NE MET PAS EN APPLICATION" is entered; where reasons are given they are placed after the reservations under the heading "comments".

(6) When a NED or forecast NED has been determined it is entered here.

(7) In the case of a covering STANAG with an NED, an "X" is inserted in the implementation column showing the services implementing the AP.

(8) In the case of an Unclassified STANAG, nations have or have not authorised the release of the STANAG to NACC/PfP Partners.

(9) For the purposes of this STANAG, not to include documents drafted outside of this STANAG, the following rules apply.

a. Un-numbered headings (e.g., GRAPHIC DATA) will be all upper case and underlined.

b. Numbered Headings (including lettered and sub-numbered (e.g., Representation of Textual Information.) will be Title case (as shown) and underlined with period. NOTE: Beware of n^{th}. Do not capitalise this and similar expressions.

c. Headings within tables will be as numbered headings.

d. Figure and table headings, use title case, no underline.

e. The following shall always be capitalised:

Segment	Extended Header	Block Image Mask
Header	Image Data Mask	Reserved Segment
Subheader	Image Pixel	Conditional Field, page C-2, paragraph 8, lower case
Pad Pixels	Standard Data Segments	Required Field, page C-2, paragraph 8, lower case
Data Field	Subheader Field	Complexity Level
Header Field	Data Segment	

f. Integer will be lower case without brackets.

g. A noun becomes a proper noun when it is specific to NSIF (e.g., NSIF Field, the word field is capitalised. When field is associated with a code (e.g., TXFMT page C-14) the word field is not capitalised.)

h. Problem areas:

   (1) Text data, image data, and graphic data when written of generically remain lower case. When refering to NSIF specific data (i.e., a Segment) they become proper nouns.

   (2) Blocked image is a generic term and therefore lower case.

   (3) Conditional field and required field are generic terms and therefore lower case.

   (4) Image Data Mask and Block Image Mask are proper nouns.

   (5) Pad Pixels is a proper noun.

i. Spell out code name in numbered paragraphs Headers and then you can use acronym in succeeding subparagraphs. In a new succeeding numbered paragraph headings, the full version of the expression should be used.

j. Associated data which is defined in Terms is not capitalised in the text of document.

k. When writing RGB for the first time, it is to be written as Red, Green, Blue (RGB).

l. When writing YCbCr601 for the first time, it is written as follows: “YCbCr601 (Y=bright, ...)

m. When writing any term to be used as an acronym, the term is written first with the acronym in parenthesis, such as Image Compression (IC). All further use of this term within the text shall be the acronym.

NATO STANDARDIZATION AGREEMENT (STANAG)

NATO SECONDARY IMAGERY FORMAT (NSIF)

Annexes:
A. TERMS AND DEFINITIONS
B. NSIF CONCEPT OF OPERATIONS
C. NSIF FILE FORMAT
D. STANDARD GEOSPATIAL SUPPORT DATA EXTENSIONS
E. COMPLEXITY LEVELS

The following Standardization Agreements (STANAGs), Military Standards (MIL-STDs), International Telecommunion Union (ITU) Recommendations and International Standards (ISs) contain provisions which, through references in this text, constitute provisions of this STANAG. At the time of publication, the editions indicated were valid. All Recommendations and Standards are subject to revision, and parties to agreements based on this STANAG are encouraged to investigate the possibility of applying the most recent editions of the STANAGs, MIL-STDs, ITU Recommendations and ISs listed below. NATO maintains registers of currently valid STANAGs.

Referenced Documents:

IEEE 754	-	IEEE Standard for binary floating point arithmetic
ISO 1000	-	SI units and recommendations for the use of their multiples and of certain other units
ISO 4873	-	Information technology - ISO 8-bit code for information interchange - Structure and rules for implementation
ISO/IEC 7498-1	-	Information technology - Open systems interconnection - Basic reference model: The basic model
ISO/IEC 8632-1	-	Information technology - Computer graphics - Metafile for the storage and transfer of picture description information: Functional specification
ISO/IEC 8632-1 AMD1	-	Rules for profiles
ISO/IEC 8632-1 AMD2	-	Application structuring extensions
ISO/IEC 10646-1	-	Information technology - Universal Multiple-Octet Coded Character Set (UCS): Architecture and basic multilingual plane
ISO/IEC 646	-	Information technology: ISO 7 bit-coded character set for information interchange
ISO/IEC 10918-1	-	Information technology - Digital compression and coding of continuous-tone still images: Requirements and guidelines
ISO/IEC DIS 10918-3	-	Information technology - Digital compression and coding of continuous-tone still images: Extensions
ISO/IEC IS 12087-5	-	Information technology - Computer graphics and image processing - Image Processing and Interchange (IPI) - Functional specification - Part 5: Basic image interchange format (BIIF)
ITU-R RECMN BT.601-5	-	Studio encoding parameters of digital television for standard 4:3 and wide-screen 16:9 aspect ratios
ITU-T RECMN T.4 AMD2	-	Terminals for telematic services - Standardization of group 3 facsimile apparatus for document transmission

FIPS PUB 10-4	-	Countries, Dependencies, Areas of Special Sovereignty, and Their Principal Administrative Divisions
MIL-STD-188-198A	-	Joint Photographic Experts Group (JPEG) Image Compression for the National Imagery Transmission Format Standard
MIL-STD-2301	-	Computer Graphics Metafile (CGM) Implementation Standard for the National Imagery Transmission Format Standard
AC 224(AG/4)D-67	-	NATO Secondary Imagery format (NSIF) Compliance and Interoperability Test and Evaluation Program Plan
NIMA N0106-97	-	National Imagery Transmission Format Standard Bandwidth Compression Standards and Guidelines Document
NATO C-M(55) 15 (Final)	-	Security within the North Atlantic Treaty Organisation, Document, Volume I, Enclosures A, B, C, and E, Issue 4: 31 July 1972
STANAG 2215	-	Evaluation of Land Maps, Aeronautical Charts and Digital Topographic Data
STANAG 3277	-	Air Reconnaissance Request/Task form
STANAG 5500	-	NATO Message Text Formatting System (FORMETS) - ADatP-3
STANAG 7023	-	Air Reconnaissance Imagery Data Architecture
STANAG 7024	-	Imagery Air Reconnaissance Tape Recorder Standard
STANAG 7074	-	Digital Geographic Information Exchange Standard (DIGEST) - AGeoP-3A

Related Documents:

DMA TR 8350.2	-	World Geodetic System, 2nd addition
DMA TR 8358.1	-	Datums, Ellipsoids, Grids, and Grid Reference System
ISO 8601	-	Data elements and interchange formats - Information interchange - Representation of dates and times
ISO 8879	-	Information processing - Text and office systems - Standard Generalised Mark-up Language (SGML)
ISO/IEC 9069	-	Information processing - SGML support facilities - SGML Document Interchange Format (SDIF)
ISO 11172-2	-	Information technology - Coding of moving pictures and associated audio for digital storage media at up to about 1.5 Mbit/s: Video
ISO/IEC 13818-1	-	Information technology - Generic coding of moving pictures and associated audio information: Systems
ISO/IEC 13818-2	-	Information technology - Generic coding of moving pictures and associated audio information: Video
ISO/IEC 13818-3	-	Information technology - Generic coding of moving pictures and associated audio information: Audio

ISO 10918-4	-	Information technology - Digital compression and coding of continuous-tone still images: Registration procedures for JPEG profile, APPn marker, and SPIFF profile ID marker
EO 12958	-	Classified National Security Information
DOD 5200.1-R	-	Department of Defense Information Security Program Regulation
MIL-STD-6040	-	United States Message Text Formatting Program
Q-STAG 509	-	Military Symbols
STANAG 2019	-	Military Symbols for Land Based Systems
STANAG 2211	-	Geodetic Datums, Ellipsoids, Grids and Grid References
STANAG 4420	-	Display Symbology and Colours for NATO Maritime Units
STANAG 7085	-	Interoperable Data Links for Imaging Systems

AIM

1. The aim of this agreement is to promote interoperability for the exchange of Secondary Imagery among North Atlantic Treaty Organisation (NATO) Command Control Communications and Intelligence (C^3I) Systems. The NATO Secondary Imagery Format (NSIF) is the standard for formatting digital imagery files and imagery-related products and exchanging them among NATO members. The NSIF is a collection of related standards and specifications developed to provide a foundation for interoperability in the dissemination of imagery and imagery-related products among different computer systems.

AGREEMENT

2. This NATO Standardization Agreement (STANAG) is promulgated by the Chairman of the Military Agency for Standardization (MAS) under the authority vested in him by the NATO Military Committee. No departure may be made from the agreement without consultation with the Custodian. Participating nations agree to exchange Secondary Electronic Imagery in accordance with this agreement. Nations may propose changes at any time to the control authority where they will be processed in the same manner as the original agreement. Ratifying nations have agreed that national orders, manuals and instructions implementing this STANAG will include a reference to the STANAG number for purposes of identification.

DEFINITIONS

3. The terms and definitions used in this document are listed in Annex A.

GENERAL SECTION

4. This agreement contains five annexes with associated appendixes. Annex A lists the terms and definitions that apply to this agreement. Annex B explains the NSIF operational concept. Annex C contains the NSIF File Format structure and the data content for all fields defined within a NSIF File. It includes five appendixes. Appendix 1 includes the tables referred to in Annex C. Appendix 2 shows a NSIF File example, and Appendix 3 addresses NSIF implementation issues. Appendix 4 depicts the structure of a sample NSIF File. Appendix 5 describes the concepts for single images per NSIF File, multiple images per NSIF File, and multiple NSIF Files per product. Annex D references the Standard Geospatial Support Data Extensions (GEOSDE). Annex E describes the Complexity Levels (CLEVELs) to which systems may be certified.

DETAILS OF AGREEMENT

5. The NSIF STANAG defines a presentation layer protocol as defined in the International Standards Organisation - Open Systems Interconnection model (ISO/IEC 7498-1). The NSIF standard alone does not guarantee interoperability. Compatibility must also be assured at other protocol layers. Certifiable

implementation of the NSIF for support of interoperability is subject to constraints not specified in this STANAG.

IMPLEMENTATION OF THE AGREEMENT

6. This STANAG is implemented by a nation when it has issued instructions that all such equipment procured for its forces will be manufactured in accordance with the characteristics detailed in this agreement.

ANNEX A. TERMS AND DEFINITIONS

1. Acronyms. The following acronyms are used for the purpose of this agreement.

a.	ALVL	-	Attachment Level
b.	API	-	1. Application Program Interface 2. Auxiliary Parameter Identifier
c.	BCS	-	Basic Character Set
d.	BCS-A	-	Basic Character Set-Alphanumeric
e.	BCS-N	-	Basic Character Set-Numeric
f.	BE	-	Basic Encyclopaedia
g.	BIIF	-	Basic Image Interchange Format (see ISO/IEC IS 12087-5)
h.	BMP	-	Basic Multilingual Plane
i.	C	-	Conditional
j.	CAT Scan	-	Computerised Axial Tomography Scan
k.	CCS	-	Common Coordinate System
l.	CE	-	Controlled Extension
m.	CETAG	-	Controlled Extension Tag (Unique Extension Type Identifier)
n.	CGM	-	Computer Graphics Metafile
o.	CLEVEL	-	Complexity Level
p.	COTS	-	Commercial Off The Shelf
q.	CRT	-	Cathode Ray Tube
r.	C^3I	-	Command, Control, Communications, and Intelligence
s.	DES	-	Data Extension Segment
t.	DESDATA	-	DES User-Defined Data Field
u.	DESITEM	-	DES Data Segment Overflowed
v.	DESOFLW	-	DES Overflowed Header Type
w.	DESSHF	-	DES User-Defined Subheader Field
x.	DESSHL	-	DES Length of User-Defined Subheader
y.	DFAD	-	Digital Feature Analysis Data
z.	DGIWG	-	Digital Geographic Information Working Group
aa.	DIGEST	-	Digital Geographic information Exchange Standard
ab.	DIS	-	Draft International Standard

ac.	DLVL	-	Display Level
ad.	DMA	-	Defence Mapping Agency
ae.	DOD	-	Department of Defence of the United States
af.	DTAD	-	Digital Terrain Elevation Data
ag.	DTG	-	Date-Time-Group
ah.	DTM	-	Digital Terrain Model
ai.	EEI	-	1. External Environment Interface 2. Essential Elements of Information
aj.	ENCRYP	-	Encryption
ak.	FIPS PUB	-	Federal Information Processing Standard Publication
al.	FL	-	File Length
am.	FSCLAS	-	File Security Classification
an.	FTITLE	-	File Title
ao.	GEOSDE	-	Geospatial Support Data Extensions
ap.	GS	-	Graphic Segment
aq.	HL	-	NSIF File Header Length
ar.	IC	-	Image Compression
as.	ID	-	Identifier
at.	IEC	-	International Electrotechnical Commission
au.	IEEE	-	Institute of Electrical and Electronic Engineers
av.	IALVL	-	Image Attachment Level
aw.	IDLVL	-	Image Display Level
ax.	IC	-	Image Compression
ay.	ICAT	-	Image Category
az.	ILOC	-	Image Location
ba.	IMODE	-	Image Mode
bb.	IREP	-	Image REPresentation
bc.	IREPBANDn	-	n^{th} Band Representation
bd.	IS	-	1. International Standard 2. Image Segment
be.	ISO	-	International Organisation for Standardization

bf.	ISUBCATn	-	n^{th} Band Subcategory
bg.	ITU	-	International Telecommunication Union
bh.	IXSHD	-	Image Extended SubHeader Data
bi.	JPEG	-	Joint Photographic Experts Group
bj.	LIn	-	Length of n^{th} Image Segments
bk.	LISHn	-	Length of n^{th} Image SubHeader
bl.	LOC	-	Location
bm.	LSB	-	Least Significant Bit
bn.	LSn	-	Length of n^{th} Graphic Segment
bo.	LSSHn	-	Length of n^{th} Graphic SubHeader
bp.	LTn	-	Length of n^{th} Text Segment
bq.	LTSHn	-	Length of n^{th} Text SubHeader
br.	LUT	-	Look-Up Table
bs.	MAS	-	Military Agency for Standardization
bt.	MGRS	-	Military Grid Referencing System
bu.	MIL-STD	-	Military Standard
bv.	MPEG	-	Motion Picture Experts Group
bw.	MSB	-	Most Significant Bit
bx.	MTF	-	Message Text Format
by.	NATO	-	North Atlantic Treaty Organisation
bz.	NBPC	-	Number of Blocks Per Column
ca.	NBPP	-	Number of Bits Per Pixel per band
cb.	NBPR	-	Number of Blocks Per Row
cc.	NICOM	-	Number of Image Comments
cd.	NIMA	-	National Imagery and Mapping Agency
ce.	NOSE	-	NATO Open Systems Environment
cf.	NOSIP	-	NATO Open System Interconnection Profile
cg.	NPPBH	-	Number of Pixels Per Block Horizontal
ch.	NPPBV	-	Number of Pixels Per Block Vertical
ci.	NSIF	-	NATO Secondary Imagery Format

cj.	NSIFS	-	NATO Secondary Imagery Format Standard
ck.	NVECTOR	-	Vector with Cartesion coordinates
cl.	NUMDES	-	Number of Data Extension Segments
cm.	NUMI	-	Number of Images
cn.	NUMS	-	Number of Graphics Segments
co.	NUMRES	-	Number of Reserved Extension Segments
cp.	NUMT	-	Number of Text Segments
cq.	NUMX	-	NSIF File Header field reserved for future use
cr.	OADR	-	Originating Agency's Determination is Required
cs.	ONAME	-	Originator’s Name
ct.	OPHONE	-	Originator’s Phone Number
cu.	OSE	-	Open System Environment
cv.	OSI	-	Open Systems Interconnect model
cw.	PJUST	-	Pixel Justification
cx.	POLAR	-	Vectors with polar coordintes
cy.	POSIX	-	Protable Operating System Interface
cz.	PVTYPE	-	Pixel Value Type
da.	R	-	1. Required 2. Red
db.	RECMN	-	Recommendation
dc.	RES	-	Reserved Extension Segment
de.	RESDATA	-	RES User-Defined Data Field
df.	RESSHF	-	RES User-Defined Subheader Fields
dg.	RESSHL	-	RES Length of User-Defined Subheader Fields
dh.	RETAG	-	Registered Extension Tag (Unique Extension Type Identifier)
di.	RGB	-	Red, Green, Blue (components from video standardization)
dj.	RS	-	Reserved Segment(s)
dk.	Rsets	-	Reduced Resolution Data Sets
dl.	SALVL	-	Graphic Display Level
dm.	SAMI	-	Symbology and Annotations for Maps and Imagery

dn.	SAR	-	Synthetic Aperture Radar
do.	SBND	-	Symbol BouND (defines boundary limits for the graphic)
dp.	SDE	-	Support Data Extension
dq.	SDIF	-	SGML Document Interface Format
dr.	SDLVL	-	Graphic Display Level
ds.	SGML	-	Standardized Graphic Mark-up Language
dt.	SI	-	International System of Units (the modern metric system)
du.	SID	-	Secondary Imagery Dissemination
dv.	SIDS	-	Secondary Imagery Dissemination System
dw.	SIT	-	Secondary Imagery Transmission
dx.	SLOC	-	Graphic Location
dy.	SPIFF	-	Standard Profile for Image File Format
dz.	STA	-	Standard
ea.	STANAG	-	NATO Standardization Agreement
eb.	STYPE	-	Standard Type
ec.	SXSHD	-	Graphic Extended SubHeader Data
ed.	TAFIM	-	Technical Architecture Framework for Information Management
ee.	TFS	-	Transportable File Structure (see ISO/IEC IS 12087-5)
ef.	TPXCD	-	Pad Output Pixel Code
eg.	TPXCDLNTH	-	Pad Output Pixel Code Length
eh.	TRE	-	Tagged Record Extension
ei.	TS	-	Text Segment
ej.	TXSHD	-	Text Extended SubHeader Data
ek.	TXTFMT	-	Text Format
el.	UC2	-	2-Octet Coded UCS Characters
em.	UCS	-	Universal Multiple Octet Coded Character Set
en.	UDHD	-	User-Defined Header Data
eo.	UDHDL	-	User-Defined Header Data Length
ep.	UDID	-	User-Defined Image Data
eq.	UN	-	United Nations

er.	US	-	United States
es.	UT1	-	2-Octet Coded UCS Characters
et.	UTC	-	Universal Time Code
eu.	UTM	-	Universal Transverse Mercator
ev.	VDC	-	Virtual Display Coordinates
ew.	VPH	-	Video Phase History
ex.	VQ	-	Vector Quantization
ey.	XHD	-	Extended Header Data
ez.	XHDL	-	Extended Header Data Length
fa.	YCbCr601	-	Y for Brightness of signal, Cb for Chrominance (blue), Cr for Chrominance (red) (see ITU-R RECMN BT.601-5).
fb.	ZULU	-	Zero Meridian

2. Terms and Definitions. The following terms and definitions are used for the purpose of this agreement. Where possible: concepts, acronyms, names, definitions etc. have been taken from the referenced documents. However for STANAG 4545, only the definitions described in this document shall apply. Words and statements that have a relevance specific to STANAG 4545 are either capitalised or begin with a capital letter.

a. Associated Data. That related data required for completeness of the standard.

b. Attachment Level. A way to associate images and graphics during movement, rotation, or display.

c. Band. A well defined range of wavelengths, frequencies or energies of optical, electric, or acoustic radiation. At the pixel level, a band is represented as one of the vector values of the pixel. At image level band i of an image is the rectangular array of i^{th} sample values from the pixel vectors.

d. Bandwidth.
(1) The difference between the limiting frequencies within which performance of a device, in respect to some characteristic, falls within specified limits.
(2) The difference between the limiting frequencies of a continuous frequency band.

e. Base Image. The base image is the principal image of interest or focus for which other data may be inset or overlaid. The NSIF File can have none, one, or multiple base images. For multiple base images in a single NSIF File, the relative location of each base image is defined in the Image Location (ILOC) Field in each Image Subheader. This location will be the offset within the Common Coordinate System (CCS) based on the Segment to which the image is attached.

f. Basic Character Set (BCS). A subset of the Basic Multilingual Plane (BMP). The Basic Character Set (BCS) consists of the characters defined in the first row (row 0x00) of the BMP A-zone. For this reason the first octet normally used to define character positions in the BMP will be omitted when expressing BCS character codes. Valid BCS character codes, therefore, shall range from 0x00 through 0xFF.

g. Basic Character Set-Alphanumeric (BCS-A). A subset of the Basic Character Set (BCS). The range of allowable characters consists of space through tilde, codes 0x20 through 0x7E, 0x0A, 0x0C, and 0x0D.

h. Basic Character Set-Numeric (BCS-N). A subset of the Basic Character Set-Alphanumeric (BCS-A). The range of allowable characters consists of minus through the number 9, BCS codes 0x2D through 0x39, and plus, code 0x2B.

i. Basic Character Set-Numeric Integer (BCS-N interger). A subset of the Basic Character Set-Numeric (BCS-N). The range of allowable characters consists of number 0 through the number 9, BCS codes 0x30 through 0x39.

j. Basic Multilingual Plane (BMP). The Basic Multilingual Plane (BMP) is the first plane of the first group of the Universal Multiple-Octet Coded Character Set (UCS) as defined by ISO/IEC 10646-1. The BMP is a matrix consisting of 256 rows each containing 256 cells. Individual cells are indexed using a pair of octets expressed in hexadecimal format. The first octet indicates the row containing the cell and the second octet indicates the position of the cell in the specified row. Rows within the BMP are grouped into four zones: A-zone (rows 0x00 through 0x4D), I-zone (rows 0x4E through 0x9F), O-zone (rows 0xA0 through 0xDF), and R-zone (rows 0xE0 through 0xFF). The A-zone is used for alphabetic and syllabic scripts together with various symbols. The I-zone is used for unified East Asian ideographs. The O-zone is reserved for future standardization. The R-zone is restricted for graphic characters that are used in ways not explicitly constrained by ISO/IEC 10646-1.

k. BCS Space. BCS code 0x20.

l. Block. A block is a rectangular array of pixels.

m. Blocked Image. A blocked image is comprised of the union of one or more non-overlapping blocks.

n. Blocked Image Mask. A structure which identifies the blocks in a blocked image which contains no valid data, and which are not included in the NSIF File. The structure allows the receiver to recognise the offset for each recorded/transmitted block. For example, a 2x2 blocked image which contains no valid data in the second block (block 1) would be recorded in the order: block 0, block 2, block 3. The Blocked Image Mask would identify block 1 as a non-existing block, and would allow the receiving application to construct the image in the correct order.

o. Brightness. An attribute of visual perception, in accordance with which a source appears to emit more or less light. A pixel with a larger value is brighter than a pixel with a lower value.

p. Byte. A sequence of eight adjacent binary digits.

q. Character.
(1) A letter, digit, or other graphic that is used as part of the organisation, control, or representation of data.
(2) One of the units of an alphabet.

r. Common Coordinate System (CCS). The virtual two dimensional Cartesian-like coordinate space which shall be common for determining the placement and orientation of displayable data.

s. Conditional Field. A state applied to a NSIF File Header or NSIF Subheader Data Field whose existence and content is dependent on the existence and/or content of another field.

t. Coordinated Universal Time. The time scale maintained by the Bureau International de l'Heure (International Time Bureau) that forms the basis of a co-ordinated dissemination of standard frequencies and time signals.

u. Data. Information in digital format.

v. Data Communication. The transfer of information between functional units by using data transmission according to a protocol.

w. Date-Time-Group (DTG). A composite representation of date and time.

x. Digraph. A two letter reference code.

y. Display Level. The Graphic Display Level of the Segment relative to other displayed Segments in a composite display.

z. Field. Elementary set of relevant data.

aa. Graphic. Graphic data is used in the NSIF to store two-dimensional information represented as a Computer Graphics Metafile (CGM). Each Graphic Segment (GS) consists of a Graphic Subheader and a Data Field containing the graphic data. A graphic may be black and white, grey scale, or colour. Examples of graphics are circles, ellipses, rectangles, arrows, lines, triangles, logos, unit designators, object designators (ships, aircraft), text, special characters, or a combination thereof. A graphic is stored as a distinct unit in the NSIF File allowing it to be manipulated and displayed non-destructively relative to the images and other graphics in the NSIF File. This standard does not preclude the use of n-dimensional graphics when future standards are developed.

ab. Grey Scale. An optical pattern consisting of discrete steps or shades of grey between black and white.

ac. Image. A two-dimensional rectangular array of pixels indexed by row and column.

ad. Image Codes. For a vector quantized image, values in the image data section that are used to retrieve the v x h kernels from the image code book.

ae. Imagery. Collectively, the representations of objects reproduced electronically or optically on film, electronic display devices, or other media.

af. Imagery Associated Data. Data which is needed to properly interpret and render pixels; data which is used to annotate imagery such as text, graphics, etc.; data which describes the imagery such as textual reports; and data which support the exploitation of imagery.

ag. Interface.
(1) A concept involving the definition of the interconnection between two pieces of equipment or systems. The definition includes the type, quantity, and function of the interconnecting circuits and the type, form, and content of signals to be interchanged via those circuits. Mechanical details of plugs, sockets, and pin numbers, etc., may be included within the context of the definition.
(2) A shared boundary, e.g., the boundary between two subsystems or two devices.
(3) A boundary or point common to two or more similar or dissimilar command and control systems, subsystems, or other entities against which or at which necessary information flow takes place.
(4) A boundary or point common to two or more systems or other entities across which useful information flow takes place. (It is implied that useful information flow requires the definition of the interconnection of the systems which enables them to interoperate.)
(5) The process of interrelating two or more dissimilar circuits or systems.
(6) The point of interconnection between user terminal equipment and commercial communication-service facilities.

ah. Kernel. For a vector quantized image, a rectangular group of pixels used in the organisation of quantizing image data.

ai. Look-Up Table (LUT). A collection of values used for translating image samples from one value to another. The current sample value is used as an index into the Look-Up Table(s) (LUT); therefore, the number of entries in each LUT for a binary image would contain two entries, and each LUT for an 8-bit image would contain 256 entries. Multiple LUTs allow for the translation of a 1-vector pixel value to an n-vector pixel value.

aj. Magnification. The multiplication factor which causes an apparent change in linear distance between two points in an image. Thus a magnification of 2 is a change which doubles the apparent distance between two points (multiplying area by 4), while a magnification of 0.5 is a change which halves the apparent distance.

ak. Military Grid Referencing System (MGRS). A way of expressing Universal Transverse Mercator (UTM) coordinates as a character string, with the 100-kilometre components replaced by special letters (which depend on the UTM zone and ellipsoid) (see Annex E of STANAG 2211 for more details).

al. Multiplication. When used in this document the symbol ∗ shall represent the product of the values of two or more fields of information.

am. Native File Format. The format that a specific system uses for internal storage and processing of images, graphics, text and associated data.

an. Network.
(1) An interconnection of three or more communicating entities and (usually) one or more nodes.
(2) A combination of passive or active electronic components that serves a given purpose.

ao. NSIF Capable System. A system which is capable of both generating (Pack Capable) and receiving/processing (Unpack Capable) a NSIF File.

ap. Open Systems Interconnect Model. This model is defined in ISO/IEC 7498-1.

aq. Pad Pixel. A pixel with sample values that have no significant relevance to the image. Pad Pixels are used with block images when either the number of pixel rows in an image is not an integer multiple of the desired number of vertical image blocks, or when the number of pixel columns in an image is not an integer multiple of the desired number of horizontal image blocks. In all cases, the sample values for Pad Pixels shall not appear within the bounds of significant sample values for pixels which comprise the original image.

ar. Pad Pixel Mask. A data structure which identifies recorded/transmitted image blocks which contain Pad Pixels. The Pad Pixel Mask allows applications to identify image blocks which require special interpretation due to Pad Pixel content.

as. Parity. In binary-coded systems, the oddness or evenness of the number of ones in a finite binary stream. It is often used as a simple error-detection check and will detect (but not correct) the occurrences of any single bit error in a field.

at. Pixel. A pixel is represented by an n-vector of sample values, where n corresponds to the number of bands comprising the image.

au. Primary Imagery. Unexploited, original imagery data that has been derived directly from a sensor. Elementary processing may have been applied at the sensor, and the data stream may include auxiliary data.

av. Processed Imagery. Imagery that has been formatted into Image Pixel format, enhanced to remove detected anomalies and converted to a format appropriate for subsequent disposition.

aw. Protocol.
(1) [In general], A set of semantic and syntactic rules that determines the behaviour of functional units in achieving communication. For example, a data link protocol is the specification of methods whereby data communication over a data link is performed in terms of the particular transmission mode, control procedures, and recovery procedures.
(2) In layered communication system architecture, a formal set of procedures that are adopted to facilitate functional interoperation within the layered hierarchy. Note: Protocols may govern portions of a network, types of service, or administrative procedures.

ax. Pseudocolour. A user-defined mapping of n-bits into arbitrary colours.

ay. Record(ed). When used in this document, the words recorder or recorded do not refer to recording equipment or media.

az. Required Field. When applied to a NSIF File Header or Subheader Field, the term required indicates a mandatory field that must be present and filled with valid data.

ba. Reconstruction. For a vector quantized image, the process of transforming an image from a quantized form into a displayable and exploitable form.

bb. Resolution.
(1) The minimum difference between two discrete values that can be distinguished by a measuring device.
(2) The degree of precision to which a quantity can be measured or determined.
(3) A measurement of the smallest detail that can be distinguished by a sensor system under specific conditions. Note: High resolution does not necessarily imply high accuracy.

bc. Sample. The atomic element of an Image Pixel having a discrete value. One sample from the same location in each band comprising an image will combine to form a pixel.

bd. Secondary Imagery. Secondary Imagery is digital imagery and/or digital imagery products derived from Primary Imagery or from the further processing of Secondary Imagery.

be. Secondary Imagery Dissemination (SID). The process of dispersing or distributing digital Secondary Imagery.

bf. Secondary Imagery Dissemination System (SIDS). The equipment and procedures used in Secondary Imagery dissemination.

bg. Segment. A Subheader and a Data Field.

bh. Support Data Extension (SDE). Information, if provided, which adds additional capabilities to process the NSIF.

bi. Tagged Record Extension (TRE). A set of fields to allow extension of Header or Subheader Fields/Records.

bj. Text. Information conveyed as characters.

bk. Tile. Synonymous with block.

bl. Transparent Pixel. A pixel whose sample values must be interpreted for display such that the pixel does not obscure the display of any underlying pixel.

bm. Universal Multiple Octet Coded Character Set (UCS). The Universal Multiple Octet Coded Character Set (UCS) is used for expressing text that must be human readable, potentially in any language of the world. It is defined in ISO/IEC 10646-1.

bn. Universal Transverse Mercator (UTM). A system of grids for global use between latitudes 84 degrees North and 80 degrees South. The range of longitudes 180 degrees West to 180 degrees East is divided into 60 zones, each of which is a grid based on the Transverse Mercator projection. The actual grid depends on the choice of geodetic datum as well as the zone.

bo. Vector Quantization (VQ). A structuring mechanism in which many groups of pixels in an image are replaced by a smaller number of image codes. A clustering technique is used to develop a code book of best fit pixel groups, or kernels, to be represented by the codes. A form of compression is achieved because the image codes can be recorded using fewer bits than the original pixel groups they represent.

bp. Vsize. For a vector quantized image, the size of the kernel in pixels.

bq. V x H Kernel. For a vector quantized image, a rectangular group of pixels (kernels) with v-rows and h-columns.

TABLE OF CONTENTS - ANNEX B

ANNEX B. NSIF OPERATIONAL CONCEPT

1. General. Among NATO nations multiple types of systems are used for the reception, transmission, storage, and processing of images, graphics, text, and other associated data. Without special efforts, the NSIF File Format used in one system is likely to be incompatible with the format of another system. Since each system may use a unique, internal data representation, a common format for exchange of information across systems is needed for interoperability of systems within and among NATO nations. As the need for imagery-related systems grows, their diversity is anticipated to increase. The need to exchange data is also anticipated to increase, even though systems of each nation must retain their own individual characteristics and capabilities. This document defines the NSIF, the Standard NSIF File Format for imagery and imagery-related products to be used by NATO. The NSIF provides a common basis for storage and interchange of images and associated data among existing and future systems. The NSIF can be used to support interoperability by simultaneously providing a data format for shared access applications, while also serving as a Standard NSIF File Format for dissemination of images graphics, text, and associated data.

2. Relationship of NSIF to the NATO Open Systems Environment (NOSE). The NATO Open Systems Environment (NOSE, Version 2, September 1995) provides technical guidance in the areas of design and procurement of C^3I systems to take advantage of the benefits of open systems and the new technologies available in the commercial market. It should be clear that adherence to the NOSE guidance should result in cost savings over the life-cycle of systems, improve portability and scaleability, provide interoperability, enhance efficiency during the development process, etc. In order to extend the NATO Open System Interconnection Profile (NOSIP) concept and the related ISO Open Systems Interconnection (OSI) Reference Model to the broader areas of application software portability and interoperability, the definition of a NATO Information Systems Reference model is required. To avoid confusion with the OSI Reference Model, it has been called the NATO Open Systems Environment (OSE) Reference model. The NATO OSE Reference Model is a set of concepts, entities, interfaces and diagrams that provides a basis for information system users to express their requirements to the provider community in a mutually agreeable context. It provides a basis for the specification of information technology standards necessary to develop, integrate, and maintain information systems and their infrastructure. This model has been generalised to such a degree that it can accommodate a wide variety of general and special purpose systems. The OSE Reference model is not a new development, but is based on the existing models from the Institute of Electrical and Electronic Engineers Portable Operating System (IEEE POSIX) and the United States (US) Department of Defense (DOD) Technical Architecture Framework for Information Management (TAFIM). The NATO OSE Reference Model supports the successful implementation of open systems within NATO. It should be noted that the NATO OSE Reference Model is evolutionary in nature. Standards will continue to emerge and evolve as the state-of-the-art is continually pushed forward. Future needs and contexts will have to be defined. Within this overall reference model, NATO Open Systems standard interfaces, protocols, services and supporting formats will have to be defined. This reference model is necessary to establish a context for understanding how the disparate technologies required as part of a future NATO OSE relate to each other, and to provide a mechanism for identifying the key issues associated with application software portability and interoperability. The NATO OSE Reference Model does not impose any architectural constraints. Its purpose is to provide a common conceptual framework, define a common vocabulary and specify a base of standards for NATO project and procurement staff. The NATO OSE Reference Model consists of the 3 basic components: the Application Software Entity, the Application Platform Entity, and the External Environment. The two interfaces between the 3 basic components consist of the Application Program Interface (API) and the External Environment Interface (EEI). The application platform is the set of resources that provide the services upon which an application or application software would call, and is meant to make the applications independent of the underlying hardware. It provides services at its interfaces that, as much as possible, make the implementation-specific characteristics of the platform transparent to the application software. Application platform resources are accessed via APIs. The Secondary Imagery Transmission/Secondary Imagery Dissemination (SIT/SID) functionality may be categorised within NOSE as a Data Interchange Service within the Application Platform Entity. For these types of services the following standards are recommended (March 1997): Standardized Graphic Mark-up Language (SGML), SGML Document Interface Format (SDIF), Computer Graphic Metafile (CGM), Joint Photographic Experts Group (JPEG), Motion Pictures Experts Group (MPEG), MPEG-1 and MPEG-2.

3. NSIF Operations Concept. The NSIF will be used for transmission and storage of Secondary Imagery within and among NATO C^3I nodes. The NSIF has direct application to the dissemination of Secondary Imagery to requesters of imagery derived intelligence. Multimedia intelligence reports will be composed and packaged into a single NSIF File which answers the Essential Elements of Information (EEIs) of a particular

requester. The intelligence reports may be composed of textual reports along with images, annotated images, graphics, and maps. Intelligence reports are generated after an interpreter exploits primary images or further exploits secondary images pulled out of an archive. Figure B-1 illustrates example formats used in the exploitation process of the reconnaissance cycle.

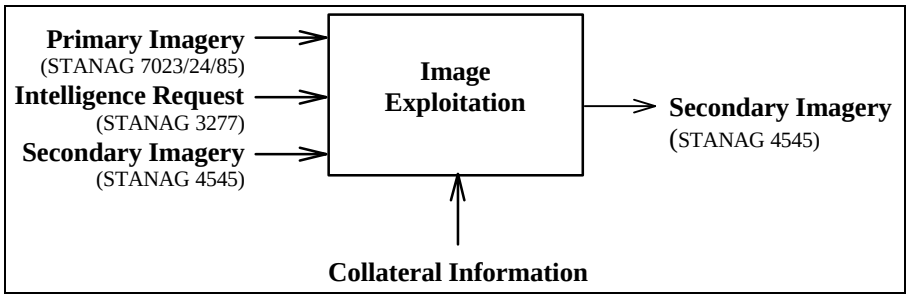


Figure B-1. NSIF Operational Concept

In the NSIF concept, imagery data interchange between systems is organised in NSIF Files and is enabled by a potential cross-translation process. When systems use other than NSIF as an internal imagery format, each system will have to translate between the system's internal representation for files, and the NSIF File Format. A system from which imagery data is to be transferred is envisioned to have a translation module that accepts information, structured according to the system's internal representation for images, graphics, text, and other associated data, and assembles this information into one file in the Standard NSIF File Format. Then the NSIF File will be exchanged with one or more recipients. Each of the receiving systems will translate the data from the NSIF File into its internal representation for images, graphics, text or other associated data. The functional architecture of this cross-translation process is shown on Figure B-2. In the diagram, the terms Native$_1$ File Format and Native$_2$ File Format refer to files represented in a way potentially unique to the sending or receiving system. Using the NSIF, each system must be compliant with only one external file format that will be used for interchange with all other participating systems. The Standard NSIF File Format allows a system to send data to several other systems since each receiving system converts the file into its own native file format. Each receiving system can translate selectively and permanently store only those portions of data in the received file that are of interest. This allows a system to transmit all of its data in one file, even though some of the receiving systems may be unable to process certain elements of the data usefully. NSIF can also serve as the internal native file format so any translation would be eliminated.

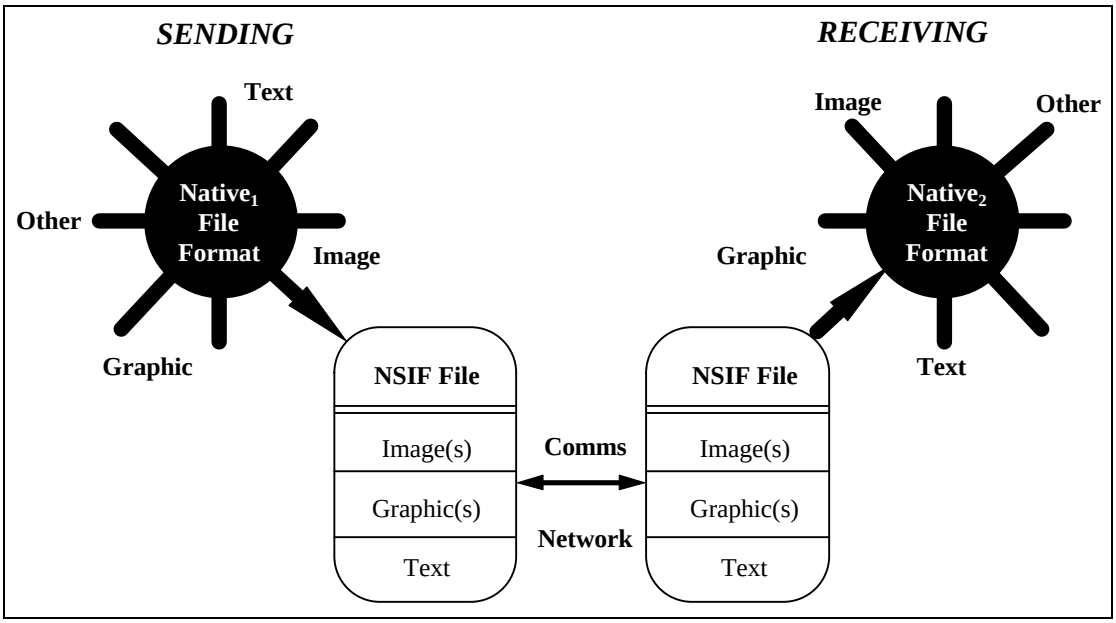


Figure B-2. NSIF Functional Architecture

4. NSIF Design Objectives. The design objectives of the NSIF are as follows:

   a. To provide a way for diverse systems to share imagery and associated data.

b. To allow a system to send comprehensive information within one NSIF File to users with diverse needs or capabilities, allowing each user to select only those portions of data that correspond to their needs and capabilities.

c. To minimise the cost and schedule required to achieve such capability.

5. NSIF General Requirements. The NSIF is specified to satisfy several general requirements in response to the role it plays in the NSIFS functional architecture. These requirements are:

a. To be comprehensive in the kinds of data permitted in the NSIF File within the image-related objectives of the format, including geolocated imagery or image related products.

b. To be implementable across a wide range of computer systems without reduction of available features.

c. To provide extensibility to accommodate data types and functional requirements not foreseen.

d. To provide useful capability with limited formatting overhead.

6. NSIF Characteristics. To serve a varied group of users exchanging multiple types of imagery and associated data who are using differing hardware and software systems, the NSIF strives to possess the following characteristics:

a. Completeness - allows exchange of all needed imagery and associated data.

b. Simplicity - requires minimal pre-processing and post-processing of transmitted data.

c. Minimal overhead - minimised formatting overhead, particularly for those users transmitting only a small amount of data and for bandwidth-limited users.

d. Universality - provides universal features and functions without requiring commonality of hardware or software.

7. NSIF File Structure. The NSIF File consists of the NSIF File Header and one or more Segment(s). A Segment consists of a Subheader and a Data Field, as shown in Figure B-3.

<table>
<tr><td colspan="7">NSIF File</td></tr>
<tr><td rowspan="2">NSIF File Header</td><td colspan="2">Segment</td><td colspan="2">...</td><td colspan="2">Segment</td></tr>
<tr><td>Sub-Header</td><td>Data Field</td><td>...</td><td>...</td><td>Sub-Header</td><td>Data Field</td></tr>
</table>

Figure B-3. NSIF File Structure

8. Common Coordinate System (CCS). The Common Coordinate System (CCS) is the virtual two dimensional Cartesian-like coordinate space which shall be common for determining the placement and orientation of displayable data within a specific NSIF File and among correlated NSIF Files which comprise an integrated product.

a. CCS Structure. The virtual CCS structure can be conceived of as a two dimensional drawing space with a coordinate system similar in structure to the lower right quadrant of the Cartesian Coordinate System. The CCS has two perpendicular coordinate axes, the horizontal column axis and the vertical row axis as depicted in Figure B-4. The positive directions of the axes are based on the predominate scan (column) and line (row) directions used by the digital imagery community. The intersection of the axes is designated as the origin point with the coordinates (0,0). Given the orientation of the axes in Figure B-4, the positive direction for the column axis is from (0,0) to the right; the positive direction for the row axis is from (0,0) downward. The quadrant represented by the positive column and positive row axes is the only coordinate space for which NSIF displayable data may be located.

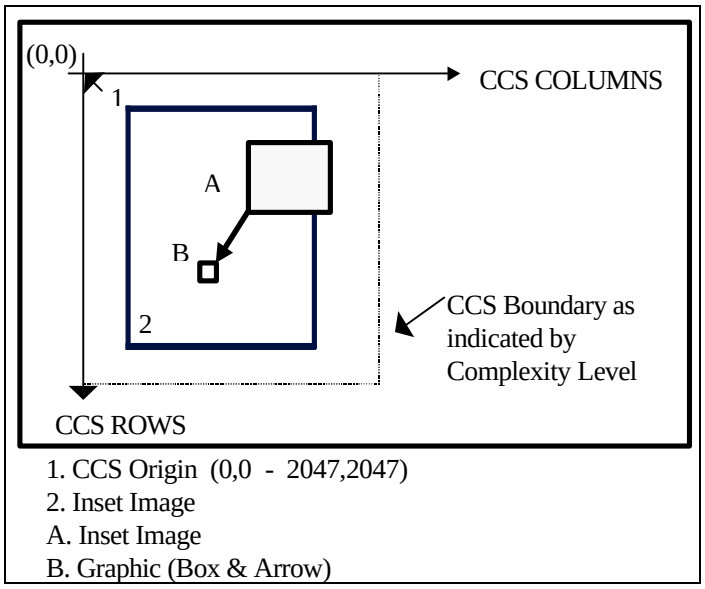


Figure B-4. Common Coordinate System (CCS) Example

b. Row and Column Coordinates. Displayable data shall be placed in the CCS according to the row and column coordinates placed in Subheader location fields (e.g., Image Location (ILOC) Field, Graphic Location (SLOC) Field). The location coordinates of a specific image or graphic (as shown in Figure B-4) represent row and column offsets from either the CCS origin point (when unattached), or the location point in the CCS to which the image or graphic is attached. Other means used to locate displayable data shall be directly correlated to row and column coordinates (e.g., displayable Tagged Record Extension (TRE) data might have geolocation data correlated with row and column indices). When location coordinates are relative to the CCS origin, they shall always have a positive value. When location coordinates are relative to the location coordinates of an image or graphic to which they are attached, both positive and negative offset values are possible.

c. Complexity Level (CLEVEL) Constraints. The upper and left boundaries of the CCS are explicitly constrained in the specification. When CLEVEL constraints are specified, one of the key attributes for specification shall be to identify the lower and right boundary drawing space constraints for a given CLEVEL.

TABLE OF CONTENTS - ANNEX C

ANNEX C. NSIF FILE FORMAT

FORMAT DESCRIPTION

1. Header, Segments, and Fields. A NSIF File contains a NSIF File Header and Segments. A Segment contains a Subheader and a Data Field. All NSIF Fields are byte aligned. The NSIF File Header carries information about the identification, classification, structure, content, size of the NSIF File as a whole, and the number and size of the major component Segments within the NSIF File. For each type of Data Segment (as shown in Figure C-1) supported by the format, there is an associated Subheader and Data Field. A Subheader contains information that describes characteristics of the Data Field that contains the actual data.

2. Extension Segments, Conditional Fields. Flexibility to add support for the types of data and data characteristics not explicitly defined in this standard is provided within the format. This is accomplished by providing for conditional fields in NSIF File Header and in each Subheader indicating the presence of TREs and providing for a group of Data Extension Segments (DES). The TREs in the Headers/Subheaders may contain additional characteristics about the corresponding data, while the DESs are intended primarily to provide a vehicle for adding support for new types of data. The Tags for the TREs will be co-ordinated centrally to avoid conflicting use.

3. Supported Data Types. A single NSIF File may comprise different types of Segments. A Segment containing information of a standard data type is called a Standard Data Segment. The organisation of the different types of Segments is described below and in Figure C-1.

a. Image Segments (IS). An Image Segment (IS) supports the standard image type of data.

b. Graphic Segments (GS). A Graphic Segment (GS) supports the standard graphic type of data.

c. Text Segments (TS). A Text Segment (TS) supports the standard text type of data.

d. Reserved Segments (RS). The Reserved Segments (RS) are place holders to support a future standard type of data, that has yet to be defined.

e. Data Extension Segments (DES). A DES supports the overflow of Standard Data Segments (see paragraph 29).

f. Reserved Extension Segments (RES). A Reserved Extension Segment (RES) is a non-Standard Data Segment which is user-defined. An NSIF File can support different user-defined types of Segments called RES (see paragraph 30).

4. Application Guidance. The NSIF File supports inclusion of Standard Data Segments of information in a single file: image, graphic, and text. It is possible to include zero, one, or multiples of each Standard Data Segment in a single file (for example: several images, but no graphics). Standard Data Segments shall be placed in the file in the following order: all IS, followed by all GS, followed by all TS.

5. Standard Data Segment Subheaders. Each individual, Standard Data Segment included in a NSIF File, such as an IS or a GS, consists of a Subheader and a Data Field. The first part of the Segment contains the Subheader, the second the corresponding Data Fields. This Subheader concerns that particular Data Field and data type only. If no Data Fields of a given type are included in the NSIF File, a Subheader for that data type shall not be included in the NSIF File. All Data Fields and associated Subheaders of a single type shall precede the first Subheader for the next data type. The ordering of multiple Data Fields of one type is arbitrary. A diagram of the overall NSIF File structure is shown on Figure C-1.

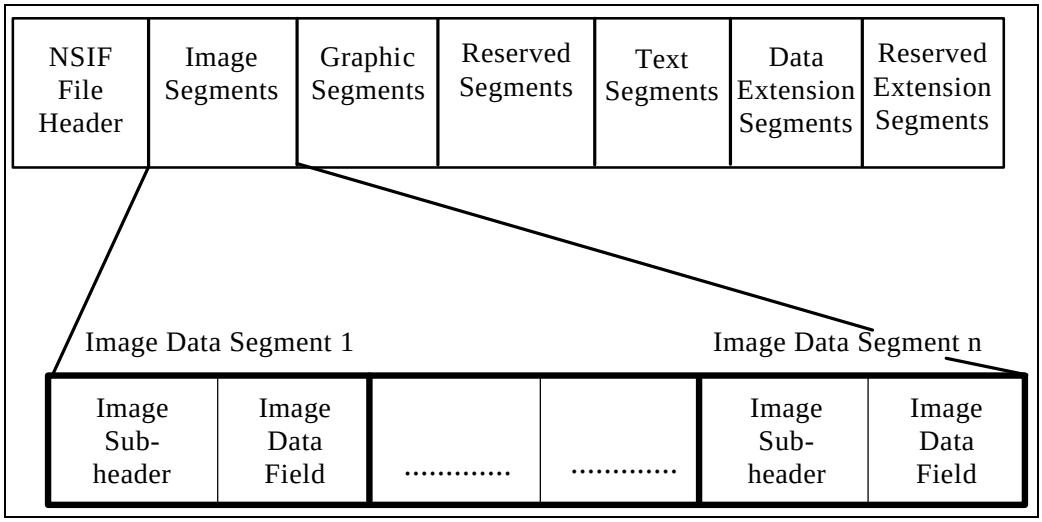


Figure C-1. NSIF File Structure

6. Header/Subheader Field Specification. The specification of the fields in the various Headers/Subheaders found within a NSIF File is provided in a series of tables in Appendix 1. Each table includes a mnemonic identifier (ID) for each field within a Header/Subheader, the FIELD's name, a description of the valid contents of the field, and any constraints on the field's use, the field SIZE in bytes, the VALUE RANGE it may contain, and an indication of its TYPE (see paragraph 8). The NSIF File Header Fields are specified in Table C-1-1. The Standard Data Segment Subheader Fields are specified in Tables C-1-3, C-1-3(A), C-1-5, and C-1-6. The TRE Subheaders (see paragraph 28) and RES (see paragraph 30) are defined in Tables C-1-7 and C-1-9. Finally, the DES Subheader Fields (see paragraph 29) are defined in Table C-1-8. The data that appears in all Header/Subheader Fields specified in the tables, including numbers, shall be represented using the printable Basic Character Set (BCS) (defined in Appendix 3, Table C-3-1) with eight bits (one byte) per character. Representing numbers in character form avoids many of the problems associated with differences in word length and internal representation among different machines. Representing the Header and Subheader Fields in BCS also makes them more easily read by humans. All field size specifications given for the Header and Subheader Fields specify a number of bytes. Fields that may contain any printable BCS characters (including punctuation marks) are indicated as Basic Character Set-Alphanumeric (BCS-A) in the VALUE RANGE specification.

7. Field Structure and Default Values. The NSIF uses character counts to delimit Header Fields, as opposed to special end-of-field characters or codes or direct addressing. These counts are provided in the tables detailing the NSIF Header and NSIF Subheader Field specifications. NSIF uses the BCS code represented in ISO/IEC 646. The BCS codes shall be seven bits, a_1 through a_7 with an eighth bit added. The eighth bit a_8, shall be set to zero (0). The a_8 bit shall be the Most Significant Bit (MSB) and a_1 shall be the Least Significant Bit (LSB). It is intended to provide for simple communications among NSIF stations. The NSIF BCS format is comprised of the following BCS characters (all numbers are decimal): Line Feed (10), Form Feed (12), Carriage Return (13), and space (32) through Tilde (126). All data in fields designated BCS-A shall be left justified and padded to the right boundary with BCS Spaces (code 0x20). All data in numeric fields (BCS-N and BCS-N integer) shall be right justified and padded to the left boundary with leading zeros. The standard default value shall be BCS Spaces (code 0x20) for alphanumeric fields and zero for numeric fields. For a few fields, a specific default may be indicated in the field description. In this case, the field description shall take precedence. All Header and Subheader Fields contained in a NSIF File shall contain either valid data (that is, data in accordance with the restrictions specified for the contents of the field in this document) or the specified default value.

8. Field Types. The NSIF File Header and various Subheaders have two types of fields: required and conditional. A required field shall be present and shall contain valid data or the specified default value. A conditional field may or may not be present depending on the value of one or more preceding (required) fields. If a conditional field is present, it shall contain valid data. When a field is conditional, its description identifies what conditions and which preceding field or fields are used to determine whether or not to include it in the NSIF File. For example, in the NSIF File Header, if the Number of Images (NUMI) Field contains the value of 2, the Length of 1st Image Subheader (LISH1), Length of 1st Image Segment (LI1), Length of 2nd Image Subheader (LISH2), and Length of 2nd Image Segment (LI2) Fields will be present and must be filled

with valid data. However, if the NUMI field contains BCS Zero (code 0x30), the Length of n^{th} Image Subheader (LISHn) and Length of n^{th} Image Segments (LIn) Fields are omitted.

9. Logical Recording Formats.

a. Bit and Byte Order.

(1) The method of recording numeric data on interchange media shall adhere to the big endian convention. In big endian format, the most significant byte in each numeric field shall be recorded and read first, and successive byte recorded and read in order of decreasing significance. That is, if an n-byte field named F is stored in memory beginning at address A, then the most significant byte of the F field shall be stored at A, the next at A+1, and so on. The least significant byte shall be stored at address A+n-1.

(2) BCS character strings shall be recorded in the order in which the data is generated.

(3) The MSB in each byte of every field, regardless of data type, shall be recorded and read first, and successive bits shall be recorded and read in order of decreasing significance.

(4) Pixel arrays shall be recorded in the order specified in the Image Mode (IMODE) Field and as discussed in paragraph 18c. Pixel arrays shall be recorded from left to right starting at the top, and non-interlaced raster scanning downward. The top left pixel shall be recorded first, and the bottom right pixel shall be recorded last.

b. Row Column Relationship. NSIF imagery is displayed by mapping each Image Pixel to a specific row r and column c within the bottom right quadrant shown on Figure C-2. Rows are represented on the vertical (y-axis) and columns are represented on the horizontal (x-axis). Moving from location (0,0) down and to the right is considered moving in a positive direction. The first pixel of an image would be placed at (r0,c0), followed by pixels (r0,c1); (r0,c2) and so on until the end of the row. The first pixel of the second row of Image Pixels would be located at (r1,c0).

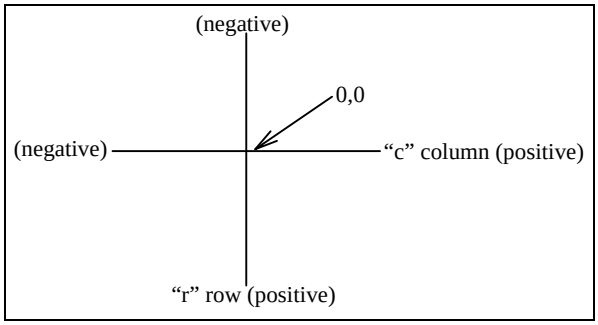


Figure C-2. Row Column Relationship

THE NSIF FILE HEADER

10. General. Each NSIF File shall begin with a Header, the NSIF File Header, whose fields contain identification and origination information, file-level security information, and the number and size of Segments of each type, e.g. IS(s), GS(s), and TS(s), contained in the NSIF File. Figure C-3 depicts the NSIF File Header. It depicts the types of information contained in the Header and shows the Header's organisation as a sequence of groups of related fields. The expansion of the Image Group illustrates how the Header's overall length and content may expand or contract depending on the number of Segments of each type included in the NSIF File. The NSIF Header is detailed in Table C-1-1.

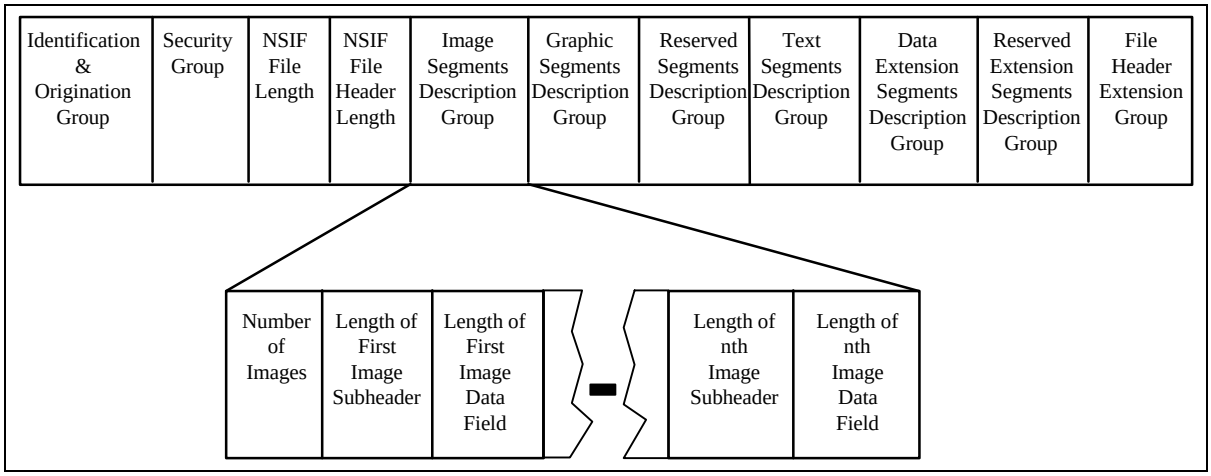


Figure C-3. NSIF File Header Structure

NSIF PRODUCT AND OVERLAY CONCEPT

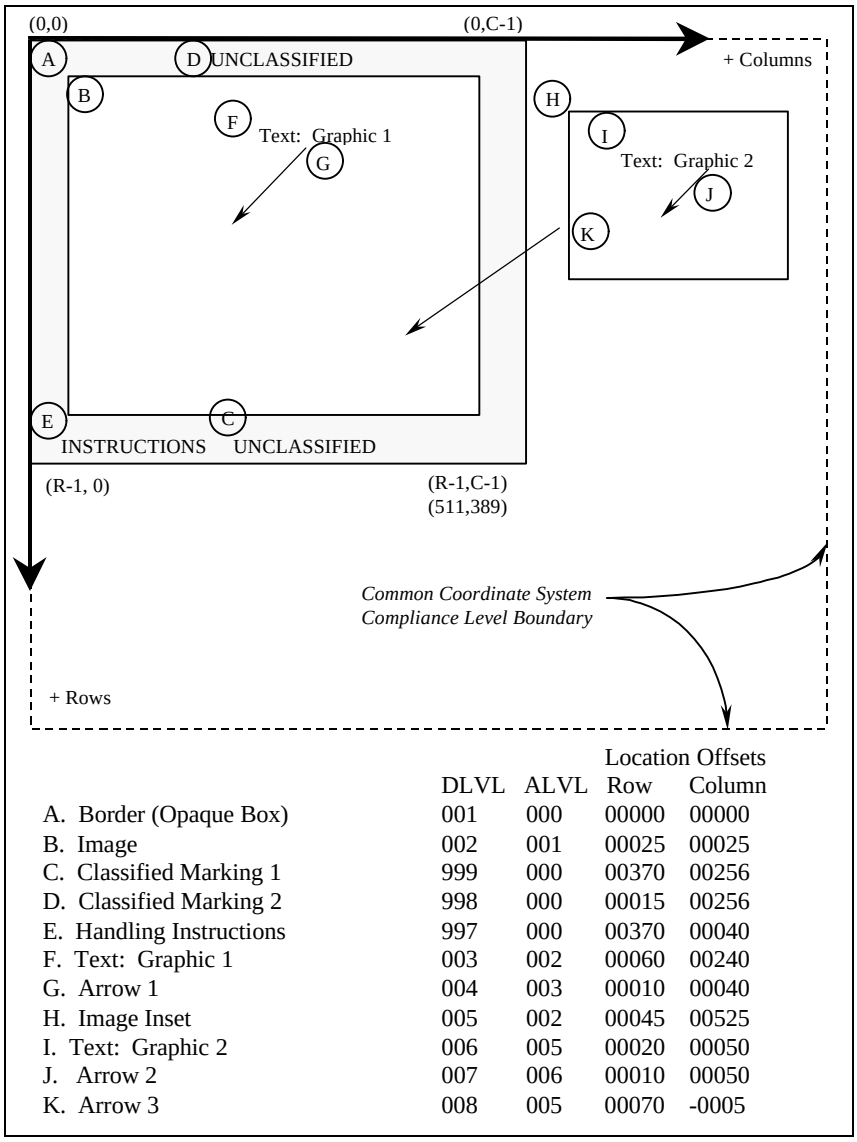
11. General. The following subsections describe the non-destructive nature of NSIF and the relationships anticipated to exist among the Segments in a NSIF File and how these relationships are represented in the NSIF File. An image product may conceivably consist of the following: a correlated set of multiple NSIF Files; a single NSIF File with multiple images, each with their own overlays and associated data; a NSIF File with no image; and/or a single NSIF File with a single image and its overlays and associated data. To facilitate description of the NSIF overlay concept, only the latter case will be addressed in the context of this subsection. (See Appendix 5 to Annex C for applying the overlay concept to the other two cases.)

12. Image Overlay Relationships. Each single NSIF File is comprised of one or more NSIF Standard Data Segments plus associated data. The association and portrayal of displayable Segments is accomplished through the use of location indices, Display Levels (DLVL) and Attachment Levels (ALVL). The placement of displayable Data Segments in the CCS (see Annex B, paragraph 8) is recorded in the location field of the Segment's Subheader. The relative visibility, when displayed, of the various displayable Segments in the NSIF File is recorded in the NSIF File by use of the DLVL fields (in the standard information type Subheaders, specifically IDLVL for images and SDLVL for graphics). Groupings of related Segments may be formed by use of the ALVL fields (in the standard information type Subheaders, specifically IALVL for images and SALVL for graphics). For example, when a base IS is present, it may form the basis for using the other data contained in the product. Images other than the base image may be associated with the base image via the use of the ILOC, IDLVL and IALVL fields of their Image Subheaders. All images and graphics associated with the base image define overlays to the base image in the sense that, when displayed, they will overwrite the underlying portion (if any) of the base image. Images and graphics associated with (attached to) the base image may be positioned such that they are completely on the base image, are partially on the base image, or completely off (adjacent to) the base image.

13. Overlays and Display Level (DLVL). The order in which images and graphics are stacked visually when displayed is determined by the IDLVL field for images and the SDLVL field for graphics in the standard information type Subheaders, not by their relative position within the NSIF File. The IDLVL and SDLVL fields contain a positive integer from 001 to 999. Every IS and GS in a NSIF File shall have a unique IDLVL or SDLVL. That is, no two Segments may have the same value in their IDLVL or SDLVL fields. This requirement allows display appearance to be independent of data processing or NSIF File sequence order.

14. Display Level (DLVL) Interpretation. The DLVL determines the display precedence of images and graphics within an NSIF File when they are output to a display device. That is, at any pixel location shared by more than one image or graphic, the value displayed there is that determined from the Segment with the highest numbered DLVL. Figure C-4 illustrates a sample output presentation from a NSIF File that illustrates the effects of DLVL assignment. The DLVL of each Segment is indicated in the list of images and graphics in Figure C-4. In the case shown, the Segment with DLVL one is not an image but rather an opaque CGM rectangle (graphic data, not image data). Because the CGM rectangle is larger than the image (which, in this case, serves as the first overlay because its DLVL is two), it provides a border to the base image. Following

increasing DLVL value, the border is overlaid by Text: Graphic 1 which is, in turn, overlaid by Arrow one, etc. The ALVL values in Figure C-4 refer to Attachment Levels.



	DLVL	ALVL	Location Offsets Row	Column
A. Border (Opaque Box)	001	000	00000	00000
B. Image	002	001	00025	00025
C. Classified Marking 1	999	000	00370	00256
D. Classified Marking 2	998	000	00015	00256
E. Handling Instructions	997	000	00370	00040
F. Text: Graphic 1	003	002	00060	00240
G. Arrow 1	004	003	00010	00040
H. Image Inset	005	002	00045	00525
I. Text: Graphic 2	006	005	00020	00050
J. Arrow 2	007	006	00010	00050
K. Arrow 3	008	005	00070	-0005

Figure C-4. NSIF Display Level (DLVL) Illustration

15. Attachment Level (ALVL). The ALVL provides a way to associate display Segments (images and graphics) with one another so they may be treated together for certain operations such as moving them, rotating them, or displaying them as a group. The ALVL of a displayable Segment shall be equal to the DLVL of the Segment to which it is attached. This value is stored in the ALVL field (specifically IALVL for images, SALVL for graphics) of the Segment's Subheader. A Segment with DLVL one (DLVL001) (the minimum DLVL in this example), must have an ALVL of zero (ALVL000). An ALVL000 shall be interpreted as unattached. The Segment having minimum DLVL shall have ALVL000 and a CCS location (0,0). Any other Segment may also have ALVL000, that is, be unattached. An overlay's DLVL shall always be numerically greater than its ALVL (that is, an overlay must be attached to something previously displayed or it is unattached). Figure C-5 shows the attachment relationships of the overlays on Figure C-4. When an overlay or base is edited (moved, deleted, rotated), all overlays attached to it, directly or indirectly, may be affected by the same operation. For example, on Figure C-5, if the exploited image (DLVL002, ALVL001) were moved one centimetre to the left, the arrows (DLVL004, ALVL003, and DLVL007, ALVL006), the image inset (DLVL005, ALVL002), and the graphic (DLVL006, ALVL005) associated with the image inset also would be moved one centimetre to the left. Recognising that because of the way the ALVL has been constructed, if the graphic annotation (DLVL003, ALVL002) were deleted, so would be its associated Arrow 1 (DLVL004, ALVL003). Although the ALVL provides the means to group or associate displayed images and graphics, the provision of user operations (e.g. moving, rotating, etc.) to act on or use ALVL information is an implementor’s choice.

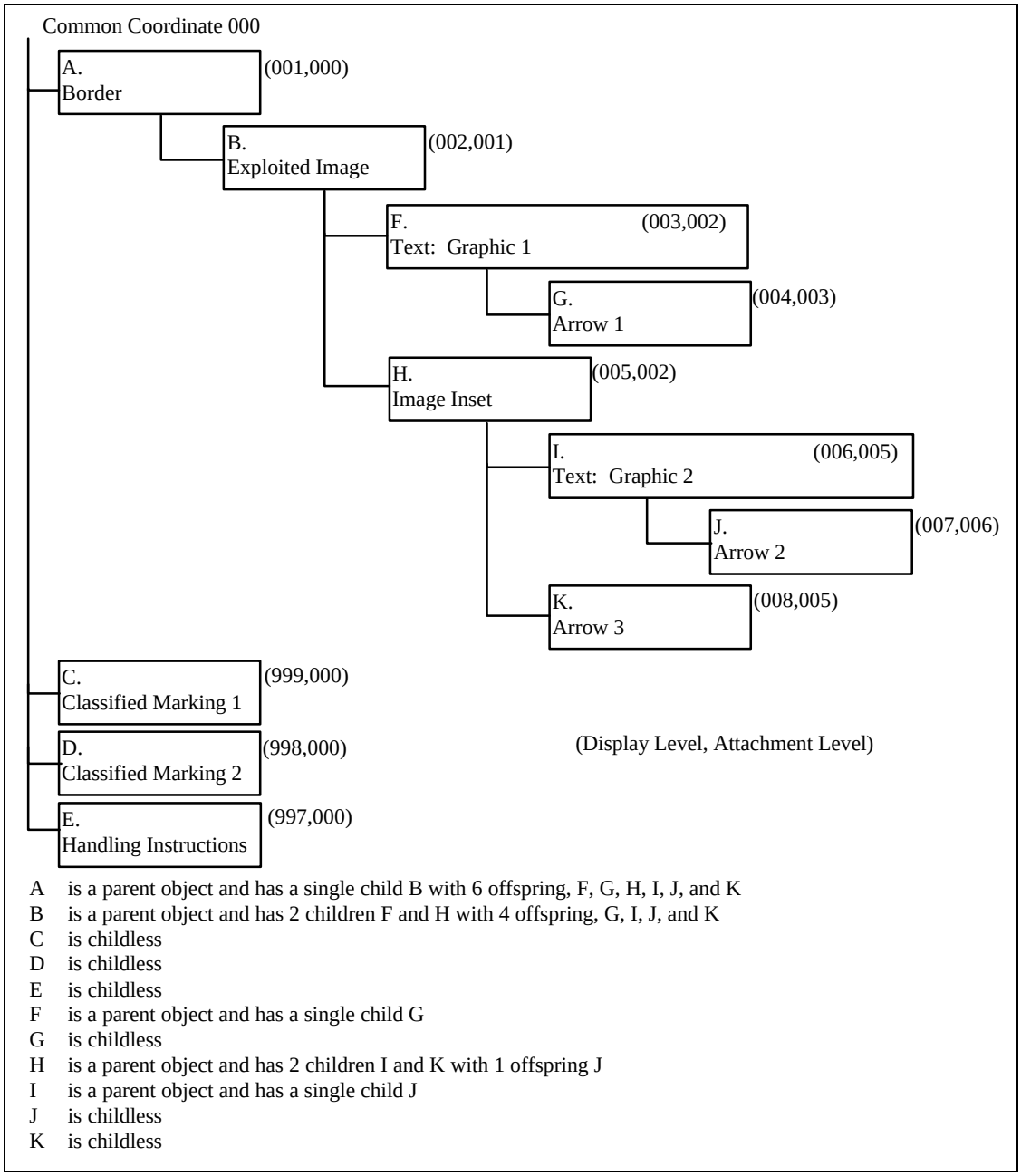


Figure C-5. Attachment Level (ALVL) Relationships

IMAGE DATA

16. General. For the NSIF, the image data encompasses multispectral imagery and images intended to be displayed as monochrome (shades of grey), colour-mapped (pseudocolour), or true colour and may include grid or matrix data intended to provide additional geographic or geo-referencing information.

a. Image Category (ICAT). The specific category of an IS reveals its intended use or the nature of its collector. Synthetic Aperture Radar (SAR) data may be included as Video Phase History (VPH) (two bands, n^{th} Band Subcategory (ISUBCATn) Field contains I and Q representing Inphase and Quadrature), two component processed complex data (either ISUBCATn contains I and Q representing Inphase and Quadrature, or ISUBCATn contains M and P representing Magnitude and Phase), individual component processed complex data (ISUBCATn contains M or P), or as a monochrome image (ISUBCATn contains BCS Spaces (code 0x20)). The possible use of Standard Support Data Extensions (SDEs) to provide geo-referencing data depends on both the intended use of the transmitted image and on its nature as described in Table C-1-2(A). The specific significance of each band in the image is indicated in ISUBCATn. Additional ICAT values are described in Table C-1-3.

b. Image Representation (IREP). An indication of the processing required in order to display an image. An image may include multiple data bands and colour Look-Up Tables (LUTs), the latter within its Header fields. True colour images (three band) may be specified to be interpreted using either the Red, Green, Blue (RGB) or the YCbCr601 (Y = Brightness of signal, Cb = Chrominance (blue), Cr = Chrominance (red)) colour system. Grids or matrix data may include one, two, or several bands of attribute values intended to provide additional geographic or geo-referenced information. VPH requires SAR processing to produce a displayable image. Vectors with Cartesion coordinates (NVECTOR) and vectors with polar coordinates (POLAR) require appropriate vector calculations to produce a displayable image. The processing required to display each band of the image is indicated in the nth Band Representation (IREPBANDn) Field (see Table C-1-2). Additional IREP values are described in Table C-1-3.

17. Image Model. For the NSIF, an image is a two-dimensional rectangular array of pixels indexed by row and column. A pixel is represented by an n-vector of sample values; where n corresponds to the number of bands comprising the image. The i^{th} entry of the pixel (vector) is the pixel value for the i^{th} band sample of the image. Therefore, the i^{th} band of the image is the rectangular array of i^{th} sample values from the pixel vectors. For an image designated I with R rows and C columns, the coordinates of the Image Pixel located in the c^{th} column of the r^{th} row shall be denoted by an ordered pair (r,c), $0 \le r < R$, $0 \le c < C$, where the first number, r, indicates the row and the second number, c, indicates the column in the image array. This notation is standard for addressing arrays and matrices. The pixel located at (r,c) is denoted by I(r,c). For example, a typical 24-bit RGB image is an array of R rows and C columns, where each indices (r,c), $0 \le r < R$, $0 \le c < C$, identifies a pixel I(r,c) consisting of three single byte values (a three-vector) corresponding to the RGB samples. The image has three bands, each consisting of a R-by-C array of single byte sample values. One band comprises all the red, one band comprises all the green, and the third band comprises all the blue pixel sample values. Specifically, the value at position (r,c) in the green band, for example, contains the green byte from the pixel I(r,c) three-vector at position (r,c) in the image.

a. Display of NSIF Images. When an image with R rows and C columns is displayed, a mapping is accomplished from the stored Image Pixel value array I to a rectangular array S of physical picture elements, for example a Cathode Ray Tube (CRT) display. This mapping will be called the display mapping. Usually, the resulting display has an identified top, bottom, and left and right side. In a particular application, the display mapping may be defined explicitly. However, lacking this, an image stored in a NSIF File shall be interpreted so that pixel I(0,0) is at the upper left corner, and pixel I(R-1,C-1) is at the lower right corner. The r^{th} row of the image array I shall form the r^{th} row of the display, counting from the top, $0 \le r < R$. Within the r^{th} row, the pixels shall appear beginning on the left with I(r,0) and proceeding from left to right with I(r,1), I(r,2), and so on, ending with I(r, C-1). Figure C-6 illustrates the display mapping just described. This mapping of pixel values to physical picture elements is typical of non-interleaved raster pattern of picture elements. The relationship of the pixels I(r,c) in the array to up, down, left and right implicit in this diagram is used freely in later descriptions to simplify exposition.

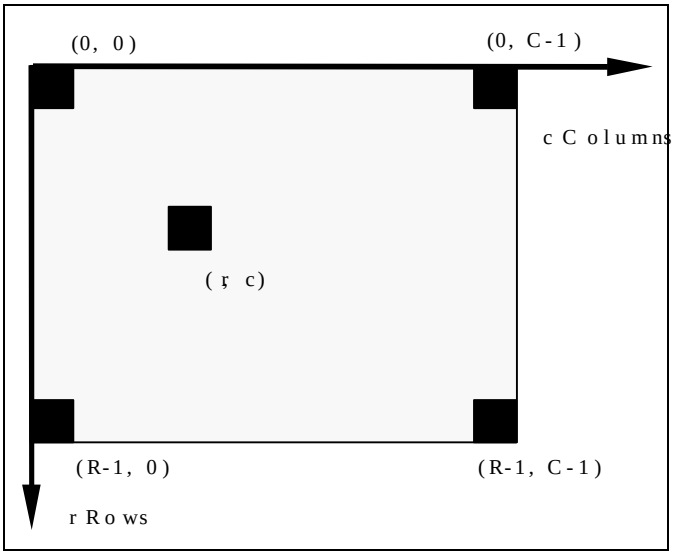


Figure C-6. Image Coordinate System

b. Blocked Images. The concept blocked images, extends the image model for NSIF presented above to support the representation of an image in terms of an orderly set of subimages (or subarrays) called blocks. For large images (e.g. those having more horizontal and vertical pixel values than typical display devices), the performance of an imagery implementation can be potentially improved by blocking the image; that is, ordering the pixel values in the NSIF File as a series of concatenated pixel arrays.

(1) The idea behind a blocked image is analogous to a rectangular tiled floor. Regard the overall floor cover as the image and each individual tile as a block. To make this more precise, let I be an image of R rows and C columns, and let the Number of Pixels Per Block Horizontal (NPPBH), (that is, the number of columns of each block) and the Number of Pixels Per Block Vertical (NPPBV), (that is, the number of rows in each block) be positive integers that satisfy NPPBH ≤ C and NPPBV ≤ R. If R is an integral multiple of NPPBV and C is an integral multiple of NPPBH, then I may be viewed as an array B of subarrays each having NPPBV rows and NPPBH columns. These subarrays $B_{r,c}$ are called blocks. The block $B_{r,c}$ is in the r^{th} row of blocks and the c^{th} column of blocks. The number of columns of blocks (Number of Blocks Per Row (NBPR)) is the integer C/NPPBH and the number of rows of blocks (Number of Blocks Per Column (NBPC)) is the integer R/NPPBV.

(2) For recording purposes, the image blocks are ordered and indexed sequentially by rows, i.e., B(1,1) … B(1, NBPR); B(2,1) … B(2,NBPR); B(NBPC,1)… B(NBPC,NBPR). The relation of image blocks to image rows and columns is depicted on Figure C-7(a) using the NSIF display convention described in paragraph 17a. Although the pixel values are placed in the NSIF File as a series of arrays (blocks), the coordinate used to reference any specific pixel remains the same as if the image were not blocked. For example, if R = C =2048 and NPPBV = NPPBH = 1024, there will be four blocks in the image I. The second pixel value in B(1,2) has the coordinate I (0,1025) vice the internal index (0,1) of the subarray.

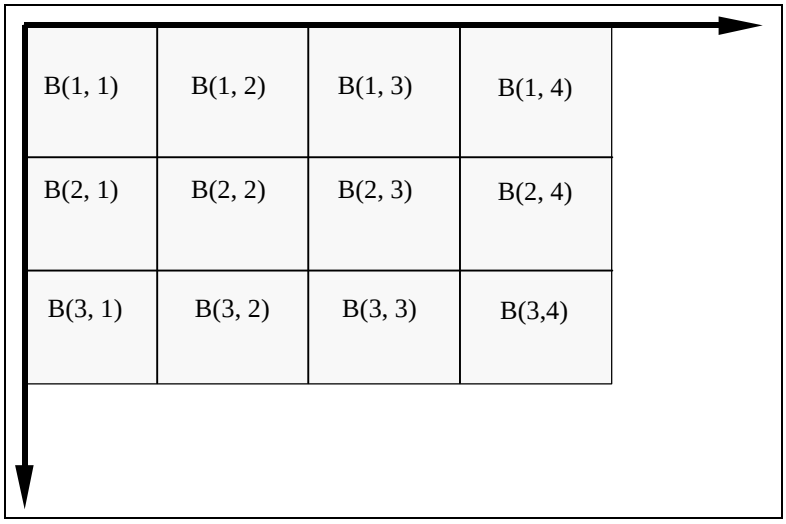


Figure C-7(a). A Blocked Image

(3) If the number of rows in an image is not initially an integer multiple of the value of the NPPBV field, or if the number of columns is not an integer multiple of the value of the NPPBH field, an application that creates the blocked image construct in NSIF shall pad the image to an appropriate number of rows and columns so the divisibility condition is met by adding rows to the bottom and/or columns to the right side of the image, as viewed in Figure C-7(b). The result is that a blocked image may have a block(s) (subarray(s)) comprised of pixel values from the original image and Pad Pixels inserted to meet block boundary conditions. If R (the number of rows in an image) is not initially an integer multiple of NPPBV, then NBPC is the integer [R/NPPBV] + 1; if C (the number of columns in an image) is not initially an integer multiple of NPPBH, then NBPR is the integer [C/NPPBH] + 1 ([r]: = largest integer ≤ r).

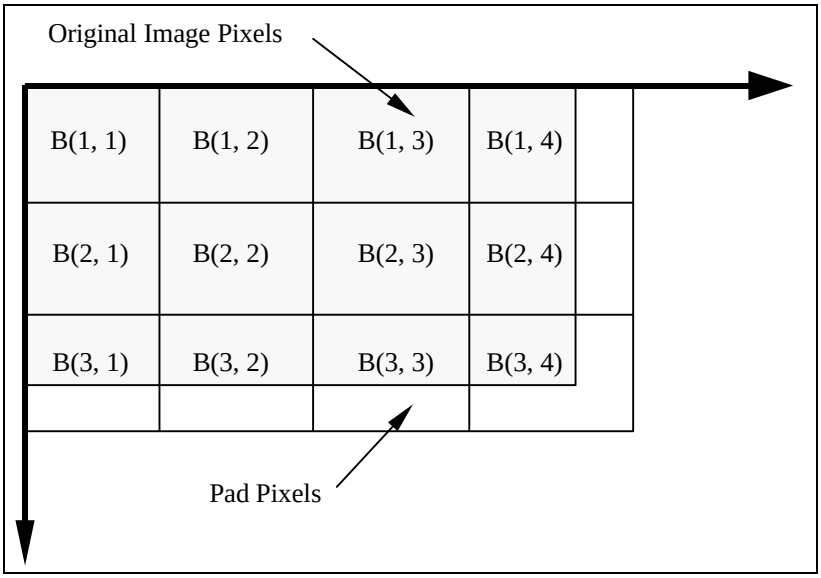


Figure C-7(b). A Blocked, Padded Image

c. Blocked Image Masking. In some instances, a blocked image may have a considerable number of empty blocks (blocks without meaningful pixel values). This might occur when a rectangular image is not north aligned when scanned or otherwise sampled, but has been rotated to a north up orientation (see Figure C-7(c)) resulting in the need to insert Pad Pixels to maintain the rectangular raster pattern of the pixel array. In this case, it is sometimes useful not to record or transmit empty blocks within a NSIF File. However, if empty blocks are not recorded/transmitted, the image loses its logical structure as an image with the number of blocks described by the product of the values of the NBPR field and the NBPC field (NBPR ∗ NBPC). In order to retain logical structure, and to allow the exclusion of empty blocks, an Image Data Mask Table identifies the location of non-empty blocks so that the using application can reconstruct the image correctly. In Figure C-7(c), the recording order would be B(1,1); B(1,2); B(1,3); B(2,1); B(2,2); B(2,3); B(2,4); B(3,1); B(3,2); B(3,3); B(3,4); B(4,2); B(4,3); B(4,4). Blocks B(1,4) and B(4,1) would not be recorded in the NSIF File. The Blocked Image Mask would identify the locations of the recorded image blocks. If the image is band sequential (the value of the IMODE field is equal S), there will be multiple Block Image Masks (one for each image band), with each mask containing the number of records described by the product of the values of the NBPR field and the NBPC field (NBPR ∗ NBPC). Blocked Image Masks can be used in conjunction with a Pad Pixel Mask, as described below. A Blocked Image Mask may also be used to provide an index for random access within the blocked image data for large images, even if all blocks are recorded in the NSIF File.

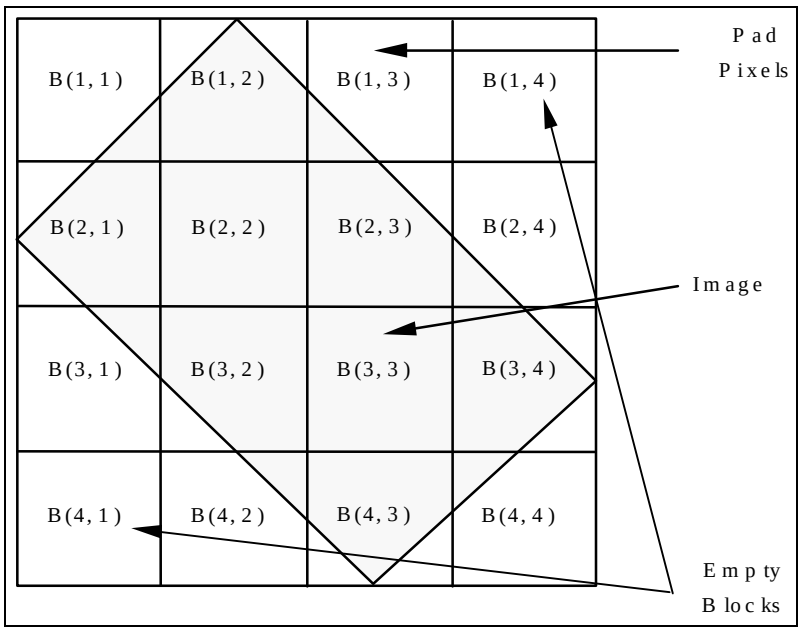


Figure C-7(c). A Blocked, Padded Image with Empty Blocks

d. Pad Pixel Masking. In addition to empty image blocks, Figure C-7(c) also demonstrates that a significant number of Pad Pixels may be needed to fill an image to the nearest block boundary.

(1) In the example in Figure C-7(c), the locations of blocks B(1,1); B(1,2); B(1,3); B(2,1); B(2,3); B(2,4); B(3,1); B(3,2); B(3,4); B(4,2); B(4,3); and B(4,4) would be recorded indicating that those blocks have Pad Pixels. B(1,4); B(2,2); B(3,3), and B(4,1) do not have Pad Pixels because B(1,4) and B(4,1) are empty and B(2,2) and B(3,3) are full image blocks.

(2) If the image is band sequential (the IMODE field contains S), there will be pixel masks that will be arranged in the same order as the image bands, with each mask containing the number of records described by the product of the values of the NBPR field and the NBPC field (NBPR ∗ NBPC).

(3) The output pixel code which represents Pad Pixels is identified within the Image Data Mask by the Pad Output Pixel Code (TPXCD) Field. The length in bits of this code is identified in the Transparent Output Pixel Code Length (TPXCDLNTH) Field. Although this length is given in bits, the actual TPXCD value is stored in an integral number of bytes. When the number of bits used by the code is less than the number available in the TPXCD field (for example, a 12 bit code stored in two bytes), then the code will be justified in accordance with the Pixel Justification (PJUST) Field in the Image Subheader.

(4) When an application identifies Pad Pixel values, it may replace them with a user-defined value (for example, a light blue background) at the time of presentation except when the value of theTPXCD field is BCS Zero (code 0x30). When the value of the TPXCD field is BCS Zero (code 0x30), the Pad Pixel will be treated as transparent for presentation. The application may choose to ignore Pad Pixels in histogram generation. In any case, Pad Pixels are not valid data, and should not be used for interpretation or exploitation. Consequently, the value used for Pad Pixels shall not appear within the bounds of significant pixels of the image.

18. NSIF Image information. In the NSIF, the information describing an image is represented in a series of adjacent fields grouped into the Image Subheader followed by the image data. The field containing the actual image data shall follow immediately the last field of the corresponding Image Subheader with no intervening special characters to designate the beginning of the image. Similarly, the Image Subheader of the first image shall follow immediately the last byte of data of the last field in the NSIF File Header, and the Image Subheader of successive images shall follow immediately the last byte of the image of the preceding image.

a. Image Subheader. The data in the Image Subheader Fields are BCS character data (except for LUTs). They provide information about the image source, its identification, and characteristics needed to display and interpret it properly. The Image Subheader Field definitions are detailed in Table C-1-3.

b. Image Data Mask. The Image Data Mask Table is a conditional data structure included in the Image Data Field for masked images when so indicated by the Image Compression (IC) Field value (NM, M1, M3, M4 or M5). The Image Data Mask Table is not recorded for non-masked images (IC values NC, C1, C3, C4 and C5). The Image Data Field of a masked image is identical to that of non-masked images except for the following: the first byte of the image data is offset from the beginning of the Image Data Field by the length of the Image Data Mask Table(s); and empty image blocks are not recorded/transmitted in the image data area. If the image is band sequential (the IMODE field contains S), there will be multiple Blocked Image and/or Pad Pixel Masks (one for each band). All Blocked Image Masks will be recorded first, followed by all Pad Pixel Masks. Since the Image Data Mask Tables are in the image data area, the data recorded/transmitted there are binary. The structure of the Image Data Mask Table is defined in detail in Table C-1-3(A).

c. Image Data Format. Image data may be stored in a NSIF File in either uncompressed or compressed form.

(1) Uncompressed Image Data Format. The order in which pixel values of a single band image are stored is fixed. When an image has more than one band, several options are available for the order in which pixel values are stored. The option used is indicated by the IMODE field in the Image Subheader. The following subparagraphs describe the possibilities within this format. In

describing the encoding of image data, the NSIF display convention is invoked freely for ease of expression. Let the image to be encoded be denoted by I, and assume I has R rows and C columns. Let I have n bands; that is, each pixel is an n-vector, the i^{th} value of which is the value for that pixel location of the i^{th} band of the image. Let N denote the Number of Bits per Pixel per Band (NBPP). Thus, there are $n * N$ bits-per-pixel. Let I be blocked with H blocks per row and V blocks per column. Note that special cases such as single band images and single block images are included in this general image by setting n = 1, and H = V = 1, respectively.

(a) Single Band Image Uncompressed Data Format. For single band images, n = 1, and there is only one order for storing pixels. The IMODE field in the Image Subheader shall be set to B for this case. The blocks (one or more) shall be stored, one after the other starting with the upper left block and proceeding first left to right across rows of blocks, one row of blocks after the other, top to bottom. Image data within each block shall be encoded as one continuous bit stream, one pixel value after another, beginning with the N bits of the upper left corner pixel, I(0,0), followed by the N bits of I(0,1) and so on until all pixels from the first row in the block are encoded. These shall be followed immediately by the N bits of data for pixel I(1,0) continuing from left to right along each row, one row after another from the top of the block to the bottom. The last byte of each block's data is filled with binary zeros to the next byte boundary, but all other byte boundaries within the block are ignored. (See the Pixel Value Type (PVTYPE) Field description in Table C-1-3 for the specification of the bit representation of pixel values.)

(b) Multiple Band Image Uncompressed Data Format. For multiple band images, there are four orders for storing pixels.

{1} Band Sequential. The first case is band sequential, in which each band is stored contiguously, starting with the first band, one after the other, until the last band is stored. Within each band the data shall be encoded as if it were a single band image with one or more blocks (see paragraph 18c(1)(a)). The value of the IMODE field in the Image Subheader shall be set to S for this case. This case is only valid for images with multiple blocks and multiple bands. (For single block images, this case collapses to the band interleaved by block case where the value of the IMODE field is set to B.)

{2} Band Interleaved by Pixel. The ordering mechanism for this case stores the pixels in a block sequential order in which each block is stored contiguously, starting with the upper left block and proceeding first left to right across rows of blocks, one row of blocks after the other, top to bottom. For band interleaved by pixel the $n * N$ bits of the entire pixel vector are stored pixel-by-pixel in the same left to right, top to bottom pixel order as described in paragraph 18c(1)(a). The $n * N$ bits for a single pixel are stored successively in this order: the N bits of the first band followed by the N bits of the second band and, so forth, ending with the N bits of the last band. Each block shall be zero-filled to the byte boundary. The value of the IMODE field in the Image Subheader shall be set to P for this storage option. (See the PVTYPE field description in Table C-1-3 for the specification of the bit representation of pixel values for each band.)

{3} Band Interleaved by Block. The ordering mechanism for this case stores the pixels in a block sequential order where each block is stored contiguously, starting with upper left block and proceeding first left to right across rows of blocks, one row of blocks after the other, top to bottom. For band interleaved by block the data from each block is stored starting with the first band, one after the other until the last band is stored. Each block shall be zero-filled to the next byte boundary. The value of the IMODE field in the Image Subheader shall be set to B for this storage option. (See the PVTYPE field description in Table C-1-3 for the specification of the bit representation of pixel values for each band.)

{4} Band Interleaved by Row. The ordering mechanism for this case stores the pixel values of each band in row sequential order. Within each block, all pixel values of the first row of the first band are followed by pixel value of the first row of the second band continuing until all values of the first row are stored. The remaining rows are stored in a similar fashion until the last row of values has been stored. The value of the IMODE field shall be set to R for this option.

(2) Compressed Image Data Format. The format of the image data after compression is provided with the description of the NSIF Image Compression Algorithms in ITU-T RECMN T.4 AMD2, ISO/IEC 10918-1, ISO/IEC DIS 10918-3, and ISO/IEC IS 12087-5. Also found in these references are the conditions the data must meet before a given compression method can be applied.

d. Grey Scale Look-Up Tables (LUT). The grey scale to be used in displaying each pixel of a grey scale image is determined using the image's LUT, if present. A LUT for a grey scale image when present, shall comprise a one byte entry for each integer (the entry's index) in the range 0 to Number of LUT Entries for the n^{th} Image Band (NELUTn)-1. The bytes of the LUT shall appear in the NSIF File one after the other without separation. The entries shall occur in the index order, the first entry corresponding to index 0, the second to index 1 and so on, the last corresponding to index NELUTn-1. The display shade for a pixel in the image shall be determined by using the Image Pixel value as an index into the LUT. The LUT value shall correspond to the display grey shade in a way specific to the display device. NELUTn shall be equal to or greater than the maximum pixel value in the image to ensure that all Image Pixels are mapped to the display device.

e. Colour Look-Up Tables (LUT). Colour images are represented using the RGB colour system notation. For colour images, each LUT entry shall be composed of the output colour components red, green, and blue, appearing in the NSIF File in that order. There shall be a LUT entry for each pixel value in a particular band of a NSIF image (the entries index of the LUT will range from 0 to 2^{NBPP}-1). The LUT entries shall appear in the NSIF File in increasing index order beginning with index 0. The display colour of an Image Pixel shall be determined by using the pixel value as an index into each LUT (red, green, blue). The corresponding values for red, green, and blue shall determine the displayed colour in a manner specific to the display device. The presence of colour LUTs is optional for 24-bit per pixel (true colour) images. Pseudo-colour (e.g. 8-bit per pixel colour images) shall contain a LUT to correlate each pixel value with a designated true colour value. Pixels larger than 16 bits may not be mapped with a NSIF LUT and NSIF LUT values can be no larger than 8 bits.

GRAPHIC DATA

19. General. Graphic data is used in the NSIF to store two-dimensional information represented as a CGM CGM. Each GS consists of a Graphic Subheader and a Data Field. A graphic may be black and white, grey scale, or colour. Examples of graphics are circles, ellipses, rectangles, arrows, lines, triangles, logos, unit designators, object designators (ships, aircraft), text, and special characters. A graphic is stored as a distinct unit in the NSIF File allowing it to be manipulated and displayed non-destructively relative to the images, and other graphics in the NSIF File. This STANAG does not preclude the use of n-dimensional graphics when future standards are developed.

20. Graphic Subheader. The Graphic Subheader is used to identify and supply the information necessary to display the graphic data as intended by the NSIF File builder. The format for a Graphic Subheader is detailed in Table C-1-5.

21. Graphic Data Format. The graphic format is CGM as described in ISO/IEC 8632-1. The precise tailoring of the CGM standard to NSIF is found in MIL-STD-2301.

22. CGM Graphic Bounding Box. CGM graphic placement is defined by the SLOC field and the CGM graphic extent is given by the First Graphic Bound Location (SBND1) and Second Graphic Bound Location (SBND2) Fields. SLOC defines the origin for the CGM Coordinate System. The area covered by the CGM graphic is defined by a bounding box. The bounding box is the smallest rectangle that could be placed around the entire CGM graphic. The first bounding box coordinate (SBND1) is the upper left corner of the rectangle. The second bounding box coordinate (SBND2) is the lower right corner of the rectangle. SBND1 and SBND2 are values in the coordinate system defined by the ALVL. For ALVL000, this would be the CCS. The SBND1 and SBND2 values are calculated by adding SLOC to the coordinate values for the bounding box (upper left and lower right) corners as given in the CGM Coordinate System.

FUTURE DATA (RESERVED SEGMENTS (RS))

23. Reserved Segments (RS). The RS are place holders to support the expansion of the Reserved for Future Use (NUMX) Field within the NSIF File Header for a future standard data type, that has yet to be defined.

TEXT DATA

24. General. Text Data shall be used to store textual data or unformatted text. Text is intended to convey information about an associated Segment in the NSIF File.

25. Representation of Textual Information. The NSIF uses two different categories of textual character representations: text only and mark-up text (e.g. word processor formatted text). Each category has a set of lexical levels which constrain the use of characters within the category. The two lexical levels are: BCS-A and Universal Multiple-Octet Coded Character Set (UCS).

a. Basic Character Set-Alphanumeric (BCS-A). The BCS-A restricts the allowable characters to a relatively small set that can be represented in 8-bit per character codes. This character set is selected from ISO/IEC 646, but uses only the 'Cell-octet' of the basic coding structure described in ISO/IEC 646. The BCS uses only the 'Cell-octet' of the two-octet Basic Multilingual Plane form, implementation level 1, of ISO/IEC 646. The range of allowable characters for BCS-A consists of the following: (all printable 7-bit characters plus)

Line feed	code 0x0A
Form feed	code 0x0C
Carriage Return	code 0x0D
Space through Tilde	codes 0x20 through 0x7E (BMP block 'BASIC LATIN')

b. Universal Multiple Octet Coded Character Set (UCS). The UCS is used for expressing text in many languages of the world as defined by ISO/IEC 10646-1. The specific character set selected from UCS shall be identified by a profile. The profile shall identify the adopted form, the adopted implementation level and the adopted subset (list of collections and/or characters) in accordance with the structures defined in ISO/IEC 10646-1. When a profile defined UCS is used in a NSIF File, the coding shall contain an explicit declaration of identification of features (escape sequence) as specified in ISO/IEC 10646-1. When no declaration escape sequence is included, the default shall be that defined for BCS above.

c. Text Format (TXTFMT) Field use. The Text Format (TXTFMT) Field contains a three character code which indicates the type or format of text data contained in the Text Data Segment. The allowable field values are STA, MTF, UC2, or UT1.

(1) Standard (STA). STA designates BCS character codes. Any BCS code may be used in the Text Data Segment when STA is indicated in the TXTFMT field. All lines within a NSIF ASCII File shall be separated by carriage return/line feed pairs. A carriage return followed by a line feed shall be used to delimit lines in the text where the first character from the next line immediately follows the ASCII line feed character.

(2) Message Text Format (MTF). MTF indicates that the Text Data Segment contains BCS characters formatted according to STANAG 5500.

(3) 2-Octet Coded UCS Characters (UC2). As described in ISO 10646-1, UC2 indicates 2-octet coded UCS characters that are sometimes called Unicode.

(4) 1-Octet Coded UCS Characters (UT1). As described in ISO 4873, UT1 indicates 1-octet coded UCS characters, Basic Latin and Latin Supplement 1.

26. Text Subheader. The Text Subheader is used to identify and supply the information necessary to read and display the text within the Data Field. The Text Subheader is detailed in Table C-1-6.

FUTURE EXPANSION

27. General. Future expansion of NSIF is supported in two ways. Firstly, under the control of the Custodian and without changing the standard, built-in mechanisms and procedures allow inclusion of user-determined and user-defined data characteristics and types of data. Secondly a collection of Data Fields provide space within the NSIF File structure for adding as yet unspecified future capabilities to the standard. Extensions of all types may be incorporated into the NSIF File while maintaining backward compatibility, since the byte

count mechanisms provided allow applications developed prior to the addition of newly defined data, to skip over extension fields they are not designed to interpret. The built-in mechanism and procedures supporting NSIF expansion are:

a. Addition of further data characteristics beyond those specified in this standard is accomplished using TRE and the User-Defined Header Data (UDHD and User-Defined Image Data (UDID)), Extended Header Data (XHD), and Image (IXSHD), Graphic (SXSHD), and Text (TXSHD) Extended Subheader Data Fields. Use of these fields is described in paragraph 28.

b. The limited size of the NSIF Header and Subheader require a TRE overflow mechanism using DES as described in paragraph 29.

c. Addition of user-defined data is accomplished using RESs as defined in paragraph 30.

d. The accommodation of as yet unspecified data types can be accomplished using RSs. This ability is reserved for future use.

28. Tagged Record Extensions (TREs). There are two varieties of TREs: Controlled Extensions (CEs) and REs. Figure C-8 illustrates the concepts and formatting described in paragraphs 27a. TREs will be registered with the Custodian.

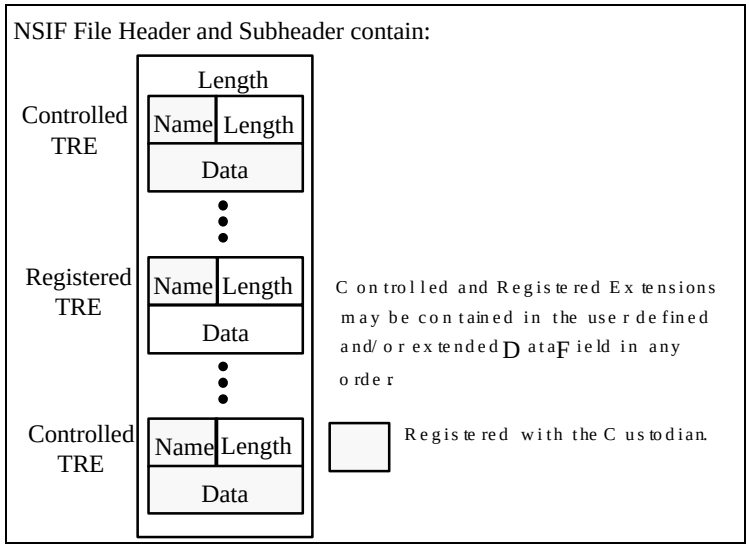


Figure C-8. Tagged Record Extension (TRE) Format

a. TRE Types.

(1) Registered TREs. The six character, user defined Registered Extension Tag (RETAG) Fields are detailed in Table C-1-7. To prevent duplication each newly defined RETAG must be registered, along with its name and purpose, with the Custodian.

(2) Controlled TREs. The six character Controlled Extension Tag (CETAG) Field and the structure of the CEDATA field are subject to full registration and configuration control by the Custodian. The Tagged Record format for CE is identical to that for REs (detailed in Table C-1-7) except that the first two letters of each field name change from RE to CE.

b. Placement of TREs. Controlled and/or Registered TREs may appear in the XHD and UDHD fields of the NSIF File Header. Placement of TREs may be in the XHD or UDHD fields of the NSIF File Header. Placement of TREs may be in either of the fields, but a single TRE cannot be split across both fields. TREs may also appear in any or all of the IXSHD, SXSHD, TXSHD, and UDID fields of the corresponding Standard Segment Subheader in the NSIF File. If the TRE carries data associated with a Standard Data Segment in the NSIF File, it shall appear in the Subheader of that specific Data Segment.

c. TRE Overflow. Because the size of NSIF Header and Subheaders is limited, NSIF provides a TRE overflow mechanism.

29. Data Extension Segment (DES) Structure. A DES is used when TREs overflow from the NSIF Header or any NSIF Subheaders. A separate DES is used for each NSIF Header or NSIF Subheader Field that overflows. Which NSIF Header or NSIF Subheader Field overflowed is indicated in the DES Overflowed Header Type (DESOFLW) and DES Data Segment Overflowed (DESITEM) Fields' contents. A TRE shall not be split between placement locations. The DES for encapsulating TREs which overflow from the NSIF File Header or Standard Data Segments is defined in Table C-1-8. The NSIF Header accommodates up to 999 DESs. Each DES shall consist of a DES Subheader and a DES Data Field (similar to the way a Standard Data Segment has a Subheader and an adjacent associated Data Field). The DES group in the NSIF Header contains the number of DES in the NSIF File, the length (size) of each DES Subheader, and the length (size) of the DES Data Field. The field size specifications in the NSIF File Header allow each DES to be just less than one gigabyte in length. The DES Subheader is detailed in Table C-1-8. The structure provided in the DES by the DES Length of User-Defined Subheader (DESSHL), DES User-Defined Subheader (DESSHF), and DES User-Defined Data (DESDATA) Fields is intended to encourage the formation of a DES similar to the Standard Data Segments in the NSIF, in which a group of BCS fields describing the data is followed by the data itself. Figure C-9 shows the DES format.

a. DES Use. TREs provide for the dissemination of data products with an image in a NSIF File. For example, Digital Terrain Elevation Data (DTED), Digital Feature Analysis Data (DFAD), or other geo-referenced products can be distributed with an image to support analysis and interpretation. Audio and Video Segments are other examples of data that can be added to a NSIF File by using a DES.

b. DES Overflow. When sufficient space is not available in the appropriate Header or Subheader, TREs may appear in a TRE_OVERFLOW DES (see paragraph 27c). When a TRE is too large to fit within the remaining field length of the associated Header or Subheader, the entire TRE shall be placed in an associated TRE_OVERFLOW DES. A TRE cannot be split between placement locations.

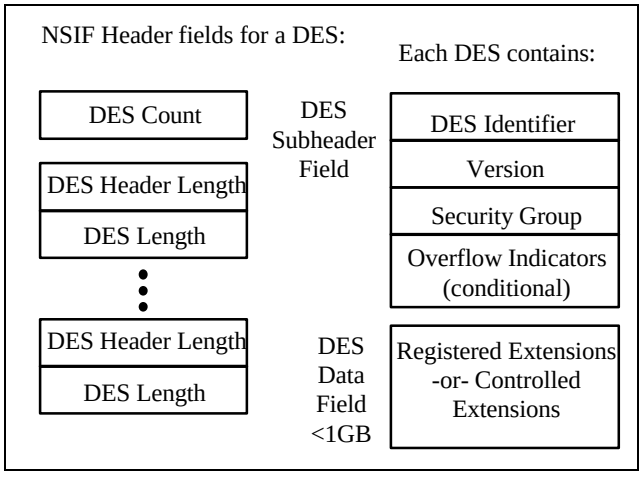


Figure C-9. Data Extension Segment (DES) Format

30. Reserved Extension Segments (RESs). Addition of user-defined types of Segments is accomplished using RES:

a. RES Use. The NSIF Header accommodates up to 999 RESs. Each RES shall consist of a RES Subheader and a RES Data Field (similar to the way a Standard Data Segment has a Subheader and an adjacent associated Data Field). The RES group in the NSIF Header contains the number of RES in the NSIF File, the length (size) of each RES Subheader, and the length (size) of the RES Data Field. The field size specifications in the NSIF File Header allow each RES to be just less than ten megabytes in length. The RES Subheader is detailed in Table C-1-9. The structure provided in the RES by the RES Length of User-Defined Subheader (RESSHL), RES User-Defined Subheader (RESSHF), and RES User-Defined Data (RESDATA) Fields is intended to encourage the formation of a RES along the lines of the Standard Data Segments in the NSIF, in which a group of BCS fields describing the data is followed by the data itself.

b. RES Overflow. The RES does not have an overflow-capability.

APPENDIX 1 TO ANNEX C. NSIF TABLES

Table C-1-1. NSIF File Header

TYPE R = Required, C = Conditional, < > = BCS Spaces (code 0x20) are allowed for the entire field
(† annotations are explained at the end of the table)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
FHDR	File Profile Name and Version. This field shall contain a BCS-A character string of the form NSIFNN.NN which indicates this file is formatted using version NN.NN of NSIF. The valid value for this field is NSIF01.00.	9	BCS-A NSIF01.00	R
CLEVEL	Complexity Level. This field shall contain the Complexity Level required to interpret fully all components of the NSIF File. Valid entries are integer assigned in accordance with complexity requirements established in Annex E.	2	BCS-N 01 to 99	R
STYPE	Standard Type. Standard type or capability. This field shall contain the BCS-A character string BF01 which indicates that this NSIF File is formatted using ISO/IEC IS 12087-5. NSIF01.00 is intended to be registered as a profile of ISO/IEC IS 12087-5.	4	BCS-A BF01	R
OSTAID	Originating Station Identifier. This field shall contain the identification code of the originating organisation.	10	BCS-A	R
FDT	File Date and Time. This field shall contain the time Universal Time Code (UTC) (Zero Meridian (Zulu)) of the NSIF File's origination in the format CCYYMMDDhhmmss, where CC is the first two digits of the century (00 to 99), YY is the last two digits of the year (00 to 99), MM is the month (01 to 12), DD is the day (01 to 31), hh is the hour (00 to 23), mm is the minute (00 to 59), and ss is the second (00 to 59). UTC (Zulu) is assumed to be the time zone designator to express the time of day.	14	BCS-N CCYYMMDDhhmmss	R
FTITLE	File Title. This field shall contain the title of the NSIF File or shall be filled with BCS Spaces (code 0x20).	80	BCS-A (Default is BCS Spaces (0x20))	<R>
FSCLAS	File Security Classification. This field shall contain a valid value representing the classification level of the entire NSIF File. Valid values are T for Top Secret, S for Secret, C for Confidential, R for Restricted, or U for Unclassified.	1	BCS-A T, S, C, R, or U	R
NOTE: If the value of the FSCLAS field is T, S, C, or R, then the FSCLSY field must be populated with a valid code for the security classification system used.				
FSCLSY	File Security Classification System. This field shall contain valid values indicating the national or multinational security system used to classify the NSIF File. Country Codes per FIPS PUB 10-4 are used to indicate national security systems. If this field is all BCS Spaces (code 0x20), it shall imply that no Security Classification System applies to the NSIF File.	2	BCS-A BE, CA, DA, FR, GE, GR, IC, IT, LU, NL, NO, PO, SP, TU, UK, US NS represents NATO Security System Additional codes shall be registered with the Custodian. (Default is BCS Spaces (0x20))	<R>
NOTE: If any of the following fields are populated with anything other than spaces, then the FSCLSY field must be populated with a valid code for the security classification system used: FSCODE, FSREL, FSDCTP, FSDCDT, FSDCXM, FSDG, FSDGDT, FSCLTX, FSCATP, FSCAUT, FSCRSN, FSSRDT, and FSCTLN.				

Table C-1-1. NSIF File Header (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
FSCODE	File Codewords. This field shall contain a valid indicator of the security compartments associated with the NSIF File. Values include one or more of the digraphs found in Table C-1-4, which is based on NATO C-M(55) 15 (Final) Volume I, and Table C-1-4(A). Multiple entries shall be separated by a single BCS Space (code 0x20). The selection of a relevant set of Codewords is application specific. If this field is all BCS Spaces (code 0x20), it shall imply that no Codewords apply to the NSIF File.	11	BCS-A (Default is BCS Spaces (0x20))	<R>
FSCTLH	File Control and Handling. This field shall contain valid additional security Control and/or Handling instructions (caveats) associated with the NSIF File. Values include digraphs found in Table C-1-4, which is based on NATO C-M(55) 15 (Final) Volume I, and Table C-1-4(A). The digraph may indicate single or multiple caveats. The selection of a relevant caveat(s) is application specific. If this field is all BCS Spaces (code 0x20), it shall imply that no additional File Control and Handling instructions apply to the NSIF File.	2	BCS-A (Default is BCS Spaces (0x20))	<R>
FSREL	File Releasing Instructions. This field shall contain a valid list of countries outside of NATO to which the NSIF File is valid for release. Typical values include one or more country codes as found in FIPS PUB 10-4 separated by a single BCS Space (code 0x20). If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File releasing Instructions apply.	20	BCS-A (Default is BCS Spaces (0x20))	<R>
FSDCTP	File Declassification Type. This field shall contain a valid indicator of the type of security declassification or downgrading instructions which apply to the NSIF File. Valid values are DD for declassify on a specific date, DE for declassify upon occurrence of an event, GD for downgrade to a specified level on a specific date, GE for downgrade to a specified level upon occurrence of an event, O for OADR, and X for exempt from automatic declassification. If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File security declassification or downgrading instructions apply.	2	BCS-A DD, DE, GD, GE, O, X (Default is BCS Spaces (0x20))	<R>
FSDCDT	File Declassification Date. This field shall indicate the date on which a NSIF File is to be declassified if the value in FSDCTP is DD. If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File Declassification Date applies.	8	CCYYMMDD (Default is BCS Spaces (0x20))	<R>

Table C-1-1. NSIF File Header (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
FSDCXM	File Declassification Exemption. This field is not for general use but may be employed by some national systems. This field shall indicate the reason the NSIF File is exempt from automatic declassification if the value in FSDCTP is X. Valid values are X1 through X8 and X251 through X259. X1 through X8 correspond to the declassification exemptions found in DOD 5200.1-R, paragraphs 4-202b(1) through (8) for material exempt from the 10-year rule. X251 through X259 correspond to the declassification exemptions found in DOD 5200.1-R, paragraphs 4-301a(1) through (9) for permanently valuable material exempt from the 25-year declassification system. If this field is all BCS Spaces (code 0x20), it shall imply that a File Declassification Exemption does not apply.	4	BCS-A X1 through X8, X251 through X259, (Default is BCS Spaces (0x20))	<R>
FSDG	File Downgrade. This field shall indicate the classification level to which a NSIF File is to be downgraded if the values in FSDCTP are GD or GE. Valid values are S for Secret, C for Confidential, and R for Restricted. If this field contains a BCS Space (code 0x20), it shall imply that NSIF File Downgrade does not apply.	1	BCS-A S, C, R (Default is BCS Space (0x20))	<R>
FSDGDT	File Downgrade Date. This field shall indicate the date on which a NSIF File is to be downgraded if the value in FSDCTP is GD. If this field is all BCS Spaces (code 0x20), it shall imply that a NSIF File Downgrade Date does not apply.	8	CCYYMMDD (Default is BCS Spaces (0x20))	<R>
FSCLTX	File Classification Text. This field shall be used to provide additional information about NSIF File Classification to include identification of a declassification or downgrading event if the values in FSDCTP are DE or GE. It may also be used to identify multiple classification sources and/or any other special handling rules. Values are user-defined free text. If this field is all BCS Spaces (code 0x20), it shall imply that additional information about NSIF File Classification does not apply.	43	BCS-A User-defined free text (Default is BCS Spaces (0x20))	<R>
FSCATP	File Classification Authority Type. This field is not for general use but may be employed by some national systems. This field shall indicate the type of authority used to classify the NSIF File. Valid values are O for original Classification Authority, D for derivative from a single source, and M for derivative from multiple sources. If this field contains a BCS Space (code 0x20), it shall imply that a file Classification Authority does not apply.	1	BCS-A O, D, M (Default is BCS Space (0x20))	<R>

Table C-1-1. NSIF File Header (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
FSCAUT	File Classification Authority. This field is not for general use but may be employed by some national systems. This field shall identify the Classification Authority for the NSIF File dependent upon the value in FSCATP. Values are user-defined free text which should contain the following information: original Classification Authority name and position or personal ID if the value in File Classification Authority Type is O; title of the document or security classification guide used to classify the NSIF File if the value in File Classification Authority Type is D; and Deriv-Multiple if the NSIF File classification was derived from multiple sources. In the latter case, the NSIF File originator will maintain a record of the sources used in accordance with existing security directives. One of the multiple sources may also be identified in FSCLTX if desired. If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File Classification Authority applies.	40	BCS-A User-defined free text (Default is BCS Spaces (0x20))	<R>
FSCRSN	File Classification Reason. This field is not for general use but may be employed by some national systems. This field shall contain values indicating the reason for classifying the NSIF File. Valid values are A through G. These correspond to the reasons for original classification per E.O. 12958, Section 1.5.(a) through (g). If this field contains a BCS Space (code 0x20), it shall imply that no NSIF File Classification Reason applies.	1	BCS-A A through G (Default is BCS Space (0x20))	<R>
FSSRDT	File Security Source Date. This field is not for general use but may be employed by some national systems. This field shall indicate the date of the source used to derive the classification of the NSIF File. In the case of multiple sources, the date of the most recent source shall be used. If this field is all BCS Spaces (code 0x20), it shall imply that a File Security Source Date does not apply.	8	CCYYMMDD (Default is BCS Spaces (0x20))	<R>
FSCTLN	File Security Control Number. This field is not for general use but may be employed by some national systems. This field shall contain a valid Security Control Number associated with the NSIF File. The format of the Security Control Number shall be in accordance with the regulations governing the appropriate security channel(s). If this field is all BCS Spaces (code 0x20), it shall imply that no File Security Control Number applies.	15	BCS-A (Default is BCS Spaces (0x20))	<R>
FSCOP	File Copy Number. This field shall contain the File Copy Number of the NSIF File. If the value of this field is all BCS Zeros (code 0x30), it shall imply that there is no tracking of numbered NSIF File copies.	5	BCS-N integer 00000 to 99999 (Default is BCS Zeros (0x30))	R
FSCPYS	File Number of Copies. This field shall contain the total Number of Copies of the NSIF File. If this field is all BCS Zeros (code 0x30), it shall imply that there is no tracking of numbered NSIF File copies.	5	BCS-N integer 00000 to 99999 (Default is BCS Zeros (0x30))	R

Table C-1-1. NSIF File Header (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
ENCRYP	Encryption. This field shall contain the value BCS Zero (code 0x30) until such time as this specification is updated to define the use of other values.	1	BCS-N integer (Default is BCS Zero (0x30)) 0 implies not encrypted	R
FBKGC	File Background Colour. This field shall contain the three colour components of the NSIF File background in the order Red, Green, Blue. Where (0x00, 0x00, 0x00) is black and (0xFF, 0xFF, 0xFF) is white.	3	Binary unsigned (0x00 to 0xFF, 0x00 to 0xFF, 0x00 to 0xFF)	<R>
ONAME	Originator's Name. This field shall contain a valid name for the operator who originated the NSIF File. If the value of this field is all BCS Spaces (code 0x20), it shall denote that no operator is assigned responsibility for origination.	24	BCS-A (Default is BCS Spaces (0x20))	<R>
OPHONE	Originator's Phone Number. This field shall contain a valid phone number for the operator who originated the NSIF File. If the value of this field is all BCS Spaces (code 0x20), it shall denote that no phone number is available for the operator assigned responsibility for origination.	18	BCS-A (Default is BCS Spaces (0x20))	<R>
FL	File Length. This field shall contain the length in bytes of the entire NSIF File including all Headers, Subheaders, and data.	12	BCS-N integer 000000000388 to 999999999999	R
HL	NSIF File Header Length. This field shall contain a valid length in bytes of the NSIF File Header.	6	BCS-N integer 000388 to 999999	R
NUMI	Number of Image Segments. This field shall contain the number of separate IS included in the NSIF File. The value of this field shall be all BCS Zeros (code 0x30) if no IS are included in the NSIF File.	3	BCS-N integer (Default is BCS Zeros (0x30)) 000 to 999	R
. . . . . Start for each Image Segment LISHn, LIn.				
NOTE: LISHn and LIn fields repeat in pairs as follows LISH001, LI001; LISH002, LI002; ..... LISHn, LIn (if the value of the NUMI field is not equal to zero).				
LISHn	Length of n^{th} Image Subheader. This field shall contain a valid length in bytes for the n^{th} Image Subheader, where n is the number of the IS(s), counting from the first IS (n=001) in order of the ISs' appearance in the NSIF File. Possible values for n are: 001 to 999. This field shall occur as many times as specified by the value of the NUMI field. This field is conditional and shall be omitted if the NUMI field contains BCS Zeros (code 0x30).	6	BCS-N integer 000439 to 999999	C
LIn	Length of n^{th} Image Segments. This field shall contain a valid length in bytes of the n^{th} ISs, where n is the number of the IS, counting from the first IS (n=001) in order of the ISs' appearance in the NSIF File. Possible values for n are: 001 to 999. If the IS is compressed, the length after compression shall be used. This field shall occur as many times as specified by the value of the NUMI field. This field is conditional and shall be omitted if the NUMI field contains BCS Zeros (code 0x30).	10	BCS-N integer 0000000001 to 9999999999	C
. . . . End for each Image Segment LISHn, LIn; the number of loop repetitions is the value specified in the NUMI field.				
NUMS	Number of Graphics Segments. This field shall contain the number of separate GSs included in the NSIF File. The value of this field shall be BCS Zeros (code 0x30) if no GSs are included in the NSIF File.	3	BCS-N integer 000 to 999	R

Table C-1-1. NSIF File Header (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
. . . . . Start for each Graphic Segment LSSHn, LSn.				
NOTE: LSSHn and LSn fields repeat in pairs as follows LSSH001, LS001; LSSH002, LS002; ..... LSSHn, LSn (if the value of the NUMS field is not equal to zero).				
LSSHn	Length of n^{th} Graphic Subheader. This field shall contain a valid length in bytes for the n^{th} Graphic Subheader, where n is the number of the GS, counting from the first GS (n=001) in the order of the GSs' appearance in the NSIF File. Possible values for n are: 001 to 999. This field shall occur as many times as specified by the value of the NUMS field. This field is conditional and shall be omitted if the NUMS field contains BCS Zeros (code 0x30).	4	BCS-N integer 0258 to 9999	C
LSn	Length of n^{th} Graphic Segment. This field shall contain a valid length in bytes of the n^{th} GS, where n is the number of the GS, counting from the first GS (n = 001) in the order of the GS's appearance in the NSIF File. Possible values for n are: 001 to 999. This field shall occur as many times as specified by the value of the NUMS field. This field is conditional and shall be omitted if the NUMS field contains BCS Zeros (code 0x30).	6	BCS-N integer 000001 to 999999	C
. . . . End for each Graphic Segment LSSHn, LSn; the number of loop repetitions is the value specified in the NUMS field.				
NUMX	Reserved for Future Use. This field is reserved for future use and shall be filled with BCS Zeros (code 0x30).	3	BCS-N integer (Default is BCS Zeros (0x30)) 000	R
NUMT	Number of Text Segments. This field shall contain the number of separate TSs included in the NSIF File. The value of this field shall be BCS Zeros (code 0x30) if no TSs are included in the NSIF File.	3	BCS-N integer (Default is BCS Zeros (0x30)) 000 to 999	R
. . . . . Start for each Text Segment LTSHn, LTn.				
NOTE: LTSHn and LTn fields repeat in pairs as follows LTSH001, LT001; LTSH002, LT002; ..... LTSHn, LTn (if the value of the NUMT field is not equal to zero).				
LTSHn	Length of n^{th} Text Subheader. This field shall contain a valid length in bytes for the n^{th} Text Subheader, where n is the number of the TS, counting from the first TS (n = 001) in the order of the TSs' appearance in the NSIF File. Possible values for n are: 001 to 999. This field shall occur as many times as specified by the value of the NUMT field. This field is conditional and shall be omitted if the NUMT field contains BCS Zeros (code 0x30).	4	BCS-N integer 0282 to 9999	C
LTn	Length of n^{th} Text Segment. This field shall contain a valid length in bytes of the n^{th} TS, where n is the number of the TS, counting from the first TS (n = 001) in the order of the TSs' appearance in the NSIF File. Possible values for n are: 001 to 999. This field shall occur as many times as specified by the value of the NUMT field. This field is conditional and shall be omitted if the NUMT field contains BCS Zeros (code 0x30).	5	BCS-N integer 00001 to 99999	C
. . . . End for each Text Segment LTSHn, LTn; the number of loop repetitions is the value specified in the NUMT field.				
NUMDES	Number of Data Extension Segments. This field shall contain the number of separate DESs included in the NSIF File. The value of this field shall be BCS Zeros (code 0x30) if no DESs are included in the NSIF File.	3	BCS-N integer (Default is BCS Zeros (0x30)) 000 to 999	R

Table C-1-1. NSIF File Header (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
. . . . . Start for each Data Extension Segment LDSHn, LDn.				
NOTE: LDSHn and LDn fields repeat in pairs as follows LDSH001, LD001; LDSH002, LD002; ..... LDSHn, LDn (if the value of the NUMDES field is not equal to zero).				
LDSHn	Length of n^{th} Data Extension Segment Subheader. This field shall contain a valid length in bytes for the n^{th} DES Subheader, where n is the number of the DES, counting from the first DES (n = 001) in order of the DES's appearance in the NSIF File. Possible values for n are: 001 to 999. This field shall occur as many times as specified by the value of the NUMDES field. This field is conditional and shall be omitted if the NUMDES field contains BCS Zeros (code 0x30).	4	BCS-N integer 0200 to 9999	C
LDn	Length of n^{th} Data Extension Segment. This field shall contain a valid length in bytes of the data in the n^{th} DES, where n is the number of the DES, counting from the first DES (n = 001) in order of the DES's appearance in the NSIF File. Possible values for n are: 001 to 999. This field shall occur as many times as are specified by the value of the NUMDES field. This field is conditional and shall be omitted if the NUMDES fields contains BCS Zeros (code 0x30).	9	BCS-N integer 000000001 to 999999999	C
. . . . End for each Data Extension Segment LDSHn, LDn; the number of loop repetitions is the value specified in the NUMDES field.				
NUMRES	Number of Reserved Extension Segments. This field shall contain the number of separate RESs included in the NSIF File. The value of this field shall be BCS Zeros (code 0x30) if no RESs are included in the NSIF File.	3	BCS-N integer (Default is BCS Zeros (0x30)) 000 to 999	R
. . . . . Start for each Reserved Extension Segment LRESHn, LREn.				
NOTE: LRESHn and LREn fields repeat in pairs as follows LRESH001, LRE001; LRESH002, LRE002; ..... LRESHn, LREn (if the value of the NUMRES field is not equal to zero).				
LRESHn	Length of n^{th} Reserved Extension Segment Subheader. This field shall contain a valid length in bytes for the n^{th} RES Subheader, where n is the number of the RES, counting from the first RES (n = 001) in order for the RES's appearance in the NSIF File. Possible values for n are: 001 to 999. This field shall occur as many times as are specified by the value of the NUMRES field. This field is conditional and shall be omitted if the NUMRES field contains BCS Zeros (code 0x30).	4	BCS-N integer 0200 to 9999	C
LREn	Length of n^{th} Reserved Extension Segment. This field shall contain a valid length in bytes for the data in the n^{th} RES, where n is the number of the RES, counting from the first RES (n = 001) in order of the RES's appearance in the NSIF File. Possible values for n are: 001 to 999. This field shall occur as many times as are specified by the value of the NUMRES field. This field is conditional and shall be omitted if the NUMRES field contains BCS Zeros (code 0x30).	7	BCS-N integer 0000001 to 9999999	C

Table C-1-1. NSIF File Header (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
. . . . . End for each Reserved Extension Segment LRESHn, LREn; the number of loop repetitions is the value specified in the NUMRES field.				
UDHDL	User-Defined Header Data Length. A value of BCS Zeros (code 0x30) shall denote that no TREs are included in the UDHD field. If a TRE exists, the field shall contain the sum of the length (size) of all the TREs (see paragraph 28) appearing in the UDHD field plus 3 (size of the UDHOFL field). If a TRE is too long to fit in the UDHD field or the XHD field, it shall be put in the TRE overflow DES with DESTAG set to the value TRE_OVERFLOW (see paragraph 29).	5	BCS-N integer (Default is BCS Zeros (0x30)) 00000 or 00003 to 99999	R
UDHOFL	User-Defined Header Overflow. This field shall contain BCS Zeros (code 0x30) if the TREs in the UDHD field do not overflow into a DES, or shall contain the sequence number of the DES into which they do overflow. This field shall be omitted if the UDHDL field contains BCS Zeros (code 0x30).	3	BCS-N integer (Default is BCS Zeros (0x30)) 000 to 999	C
UDHD	User-Defined Header Data Field. If present, this field shall contain user-defined TRE Data (see paragraph 28). The length of this field shall be the value contained by the UDHDL field minus 3 . TRE shall appear one after the other with no intervening bytes. The first byte of this field shall be the first byte of the first TRE appearing in the field. The last byte of this field shall be the last byte of the last TRE to appear in the field. This field shall be omitted if the UDHDL field contains BCS Zeros (code 0x30).	†[1]	User-defined	C
XHDL	Extended Header Data Length. A value of BCS Zeros (code 0x30) shall denote that no TREs are included in the XHD field. If a TRE exists, the field shall contain the sum of the length (size) of all the TREs (see paragraph 28) appearing in the XHD field plus 3 (size of the XHDLOFL field). If a TRE is too long to fit in the XHD field or the UDHD field, it shall be put in the TRE Overflow DES with DESTAG set to the value TRE_OVERFLOW (see paragraph 29).	5	BCS-N integer (Default is BCS Zeros (0x30)) 00000 or 00003 to 99999	R
XHDLOFL	Extended Header Data Overflow. This field shall contain BCS Zeros (code 0x30) if the TREs in the XHD field do not overflow into a DES, or shall contain the sequence number of the DES into which they do overflow. This field shall be omitted if the XHD field contains BCS Zeros (code 0x30).	3	BCS-N integer (Default is BCS Zeros (0x30)) 000 to 999	C
XHD	Extended Header Data Field. If present, this field shall contain TREs (see paragraph 28) approved and under configuration management of the Custodian. The length of this field shall be the value contained by the XHDL field minus 3. TREs shall appear one after the other with no intervening bytes. The first byte of this field shall be the first byte of the first TRE appearing in the field. The last byte of this field shall be the last byte of the last TRE to appear in the field. This field shall be omitted if the XHDL field contains BCS Zeros (code 0x30).	††[1]	TREs	C

†[1] A value as specified in the UDHDL field minus 3 (in bytes)
††[1] A value as specified in the XHDL field minus 3 (in bytes)

Table C-1-2. Display Dependent Parameters

IREP	IREPBANDn	NBANDS	PVTYPE	NLUTSn
NODISPLY	BCS Spaces (0x20)	1 to 9, 0†[2]	INT, R,C,B	0
MONO	M	1	INT, R,B	0, 1, 2, 3, 4
RGB	R,G,B	3	INT, R	0
RGB/LUT	LU	1	INT, B	3
YCbCr601	Y,Cb,Cr	3	INT	0
NVECTOR	BCS Spaces (0x20)	1 to 9, 0†[2]	INT, R,C	0
POLAR	BCS Spaces (0x20), M	2	INT, R,C	0
VPH	BCS Spaces (0x20)	2	INT, R,C	0
MULTI	BCS Spaces (0x20), M, R, G, B, LU	2 to 9, 0†[2]	INT, R,C,B	0, 1, 2, 3, 4

†[2] If NBANDS field contains 0 then XBANDS field is required where XBANDS > 9

Table C-1-2(A). Category Dependent Parameters

ICAT	ISUBCATn	NBANDS	PVTYPE	NBPP	ABPP
VIS, OP	BCS Spaces (0x20)	1	B	1	1
		1, 3	INT	8	8
				12	9 to 12
				16	9 to 16
				32	17 to 32
				64	33 to 64
			R	32	32
				64	64
SL, TI, FL, RD, EO, HR, BP, FP, VD, CAT, MRI, XRAY	BCS Spaces (0x20)	1	INT	8	8
				12	9 to 12
				16	9 to 16
				32	17 to 32
				64	33 to 64
			R	32	32
				64	64
IR	BCS Spaces (0x20), wave length	1	INT	8	8
				12	9 to 12
				16	9 to 16
				32	17 to 32
				64	33 to 64
			R	32	32
				64	64
CP, CPATCH	BCS Spaces (0x20)	3	INT	8	8
				32	17 to 32
				64	33 to 64
MAP, LEGEND	BCS Spaces (0x20)	1, 3	INT	8	8
				32	17 to 32
				64	33 to 64
MATR, LOCG	BCS Spaces (0x20), CGX, CGY. GGX, GGY (units of elevation data from DIGEST part 4 annex B)	1 to 9, 0†[2(A)]	INT	8	8
				12	9 to 12
				16	9 to 16
				32	17 to 32
				64	33 to 64
			R	32	32
				64	64
MATR	BCS Spaces (0x20)	1 to 9, 0†[2(A)]	C	64	64
MS, HS	BCS Spaces (0x20)	2 to 9, 0†[2(A)]	INT	8	8
				12	9 to 12
				16	9 to 16
				32	17 to 32
				64	33 to 64
			R	32	32
				64	64
SAR, SARIQ	BCS Spaces (0x20), I, Q, M, P	1	C	64	64
		1, 2	INT	8	8
				12	9 to 12
				16	9 to 16
				32	17 to 32
				64	33 to 64
			R	32	32
				64	64

Table C-1-2(A). Category Dependent Parameters (continued)

ICAT	ISUBCATn	NBANDS	PVTYPE	NBPP	ABPP
WIND, CURRENT	SPEED, DIRECT	2	INT	8	8
BARO, DEPTH	BCS Spaces (0x20) (units of elevation data from DIGEST Part 4 Annex B)	1	INT	8	8
				12	9 to 12
				16	9 to 16
DTEM	BCS Spaces (0x20) (units of elevation data from DIGEST Part 4 Annex B)	1	INT	8	8
				12	9 to 12
				16	9 to 16
				32	17 to 32
				64	33 to 64
			R	32	32
				64	64

†[2(A)] If NBANDS field contains 0 then XBANDS field is required where XBANDS > 9

Table C-1-3. NSIF Image Subheader

TYPE R = Required, C = Conditional, < > = BCS Spaces (code 0x20) are allowed for the entire field
(† annotations are explained at the end of the table)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
IM	File Part Type. This field shall contain the characters IM to identify the Subheader as an Image Subheader.	2	BCS-A IM	R
IID1	Image Identifier 1. This field shall contain a valid alphanumeric identification code associated with the image. The valid codes are determined by the application.	10	BCS-A User-defined	R
IDATIM	Image Date and Time. This field shall contain the time (UTC) of the image acquisition the format CCYYMMDDhhmmss, where CC is the first two digits of the century (00 to 99), YY is the last two digits of the year (00 to 99), MM is the month (01 to 12), DD is the day (0 to 31), hh is the hour (00 to 23), mm is the minute (00 to 59), ss is the second (00 to 59). UTC (Zulu) is assumed to be the time zone designator to express the time of day.	14	BCS-A CCYYMMDDhhmmss	R
TGTID	Target Identifier. This field shall contain the identification of the primary target in the image, formatted as BBBBBBBBBBFFFFFCC, consisting of ten characters of Basic Encyclopaedia (BE), followed by five characters of functional category code, followed by the two character country code as specified in FIPS PUB 10-4.	17	BCS-A (Default is BCS Spaces (0x20))	<R>
IID2	Image Identifier 2. This field shall contain the title of the image.	80	BCS-A (Default is BCS Spaces (0x20))	<R>
ISCLAS	Image Security Classification. This field shall contain a valid value representing the classification level of the image. Valid values are T for Top Secret, S for Secret, C for Confidential, R for Restricted, U for Unclassified.	1	BCS-A T, S, C, R, or U	R
NOTE: If the value of the ISCLAS field is T, S, C, or R, then the ISCLSY field must be populated with a valid code for the security classification system used.				
ISCLSY	Image Security Classification System. This field shall contain valid values indicating the national or multinational security system used to classify the NSIF File. Country Codes per FIPS PUB 10-4 are used to indicate national security systems. If this field is all BCS Spaces (code 0x20), it shall imply that no Security Classification System applies to the NSIF File.	2	BCS-A BE, CA, DA, FR, GE, GR, IC, IT, LU, NL, NO, PO, SP, TU, UK, US NS represents NATO Security System Additional codes shall be registered with the Custodian. (Default is BCS Spaces (0x20))	<R>
NOTE: If any of the following fields are populated with anything other than spaces, then the ISCLSY field must be populated with a valid code for the security classification system used: ISCODE, ISREL, ISDCTP, ISDCDT, ISDCXM, ISDG, ISDGDT, ISCLTX, ISCATP, ISCAUT, ISCRSN, ISSRDT, and ISCTLN.				
ISCODE	Image Codewords. This field shall contain a valid indicator of the security compartments associated with the NSIF File. Values include one or more of the digraphs found in Table C-1-4, which is based on NATO C-M(55) 15 (Final) Volume I, and Table C-1-4(A). Multiple entries shall be separated by a single BCS Space (code 0x20). The selection of a relevant set of Codewords is application specific. If this field is all BCS Spaces (code 0x20), it shall imply that no Codewords apply to the NSIF File.	11	BCS-A (Default is BCS Spaces (0x20))	<R>

Table C-1-3. NSIF Image Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
ISCTLH	Image Control and Handling. This field shall contain valid additional security Control and/or Handling instructions (caveats) associated with the NSIF File. Values include digraphs found in Table C-1-4, which is based on NATO C-M(55) 15 (Final) Volume I, and Table C-1-4(A). The digraph may indicate single or multiple caveats. The selection of a relevant caveat(s) is application specific. If this field is all BCS Spaces (code 0x20), it shall imply that no additional Control and Handling instructions apply to the NSIF File.	2	BCS-A (Default is BCS Spaces (0x20))	<R>
ISREL	Image Releasing Instructions. This field shall contain a valid list of countries outside of NATO to which the NSIF File is authorised for release. Typical values include one or more country codes as found in FIPS PUB 10-4 separated by a single BCS Space (code 0x20). If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File Release Instructions apply.	20	BCS-A (Default is BCS Spaces (0x20))	<R>
ISDCTP	Image Declassification Type. This field shall contain a valid indicator of the type of security declassification or downgrading instructions which apply to the NSIF File. Valid values are DD for declassify on a specific date, DE for declassify upon occurrence of an event, GD downgrade to a specified level on a specific date, GE for downgrade to a specified level upon occurrence of an event, O for OADR, and X for exempt from automatic declassification. If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File security declassification or downgrading instructions apply.	2	BCS-A DD, DE, GD, GE, O, X (Default is BCS Spaces (0x20))	<R>
ISDCDT	Image Declassification Date. This field shall indicate the date on which a NSIF File is to be declassified if the value in File Declassification Type is DD. If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File Declassification Date applies.	8	CCYYMMDD (Default is BCS Spaces (0x20))	<R>
ISDCXM	Image Declassification Exemption. This field is not for general use but may be employed by some national systems. This field shall indicate the reason the NSIF File is exempt from automatic declassification if the value in File Declassification Type is X. Valid values are X1 through X8 and X251 through X259. X1 through X8 correspond to the declassification exemptions found in DOD 5200.1-R, paragraphs 4-202b(1) through (8) for material exempt from the 10-year rule. X251 through X259 correspond to the declassification exemptions found in DOD 5200.1-R, paragraphs 4-301a(1) through (9) for permanently valuable material exempt from the 25-year declassification system. If this field is all BCS Spaces (code 0x20), it shall imply that a NSIF File Declassification Exemption does not apply.	4	BCS-A X1 through X8, X251 through X259 (Default is BCS Spaces (0x20))	<R>
ISDG	Image Downgrade. This field shall indicate the classification level to which a NSIF File is to be downgraded if the values in File Declassification Type are GD or GE. Valid values are S for Secret, C for Confidential, R for Restricted. If this field contains a BCS Space (code 0x20), it shall imply that NSIF File security downgrading does not apply.	1	BCS-A S, C, R (Default is BCS Space (0x20))	<R>

Table C-1-3. NSIF Image Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
ISDGDT	Image Downgrade Date. This field shall indicate the date on which a NSIF File is to be downgraded if the value in File Declassification Type is GD. If this field is all BCS Spaces (code 0x20), it shall imply that a NSIF File security downgrading date does not apply.	8	CCYYMMDD (Default is BCS Spaces (0x20))	<R>
ISCLTX	Image Classification Text. This field shall be used to provide additional information about NSIF File Classification to include identification of a declassification or downgrading event if the values in File Declassification Type are DE or GE. It may also be used to identify multiple classification sources and/or any other special handling rules. Values are user-defined free text. If this field is all BCS Spaces (code 0x20), it shall imply that additional information about NSIF File Classification does not apply.	43	BCS-A User-defined free text (Default is BCS Spaces (0x20))	<R>
ISCATP	Image Classification Authority Type. This field is not for general use but may be employed by some national systems. This field shall indicate the type of authority used to classify the NSIF File. Valid values are O for original Classification Authority, D for derivative from a single source, and M for derivative from multiple sources. If this field contains a BCS Space (code 0x20), it shall imply that NSIF File Classification Authority Type does not apply.	1	BCS-A O, D, M (Default is BCS Space (0x20))	<R>
ISCAUT	Image Classification Authority. This field is not for general use but may be employed by some national systems. This field shall identify the Classification Authority for the NSIF File dependent upon the value in File Classification Authority Type. Values are user-defined free text which should contain the following information: original Classification Authority name and position or personal ID if the value in File Classification Authority Type is O; title of the document or security classification guide used to classify the NSIF File if the value in File Classification Authority Type is D; and Deriv-Multiple if the NSIF File classification was derived from multiple sources. In the latter case, the NSIF File originator will maintain a record of the sources used in accordance with existing security directives. One of the multiple sources may also be identified in File Classification Text if desired. If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File Classification Authority applies.	40	BCS-A User-defined free text (Default is BCS Spaces (0x20))	<R>
ISCRSN	Image Classification Reason. This field is not for general use but may be employed by some national systems. This field shall contain values indicating the reason for classifying the NSIF File. Valid values are A through G. These correspond to the reasons for original classification per E.O. 12958, Section 1.5.(a) through (g). If this field contains a BCS Space (code 0x20), it shall imply that no NSIF File Classification Reason applies.	1	BCS-A A through G (Default is BCS Space (0x20))	<R>

Table C-1-3. NSIF Image Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
ISSRDT	Image Security Source Date. This field is not for general use but may be employed by some national systems. This field shall indicate the date of the source used to derive the classification of the NSIF File. In the case of multiple sources, the date of the most recent source shall be used. If this field is all BCS Spaces (code 0x20), it shall imply that a NSIF File Security Source Date does not apply.	8	CCYYMMDD (Default is BCS Spaces (0x20))	<R>
ISCTLN	Image Security Control Number. This field is not for general use but may be employed by some national systems. This field shall contain a valid Security Control Number associated with the NSIF File. The format of the Security Control Number shall be in accordance with the regulations governing the appropriate security channel(s). If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File Security Control Number applies.	15	BCS-A (Default is BCS Spaces (0x20))	<R>
ENCRYP	Encryption. This field shall contain the value BCS Zero (code 0x30) until such time as this specification is updated to define the use of other values.	1	BCS-N integer (Default is BCS Zero (0x30)) 0 implies not encrypted	R
ISORCE	Image Source. This field shall contain a description of the Source of the image. If the Source of the data is classified, then the description shall be preceded by the classification, including Codeword(s) contained in Table C-1-4. If the value of this field is all BCS Spaces (code 0x20), it shall imply that no Image Source data applies.	42	BCS-A (Default is BCS Spaces (0x20))	<R>
NROWS	Number of Significant Rows in Image. This field shall contain the total number of rows of significant pixels in the image. When the product of the values of the NPPBV field and the NBPC field is greater than the value of the NROWS field (NPPBV ∗ NBPC > NROWS), the rows indexed with the value of the NROWS field through (NPPBV ∗ NBPC) minus 1 shall contain fill data. NOTE: Only the rows indexed 0 through the value of NROWS field minus 1 of the image contain significant data. The pixel fill values are determined by the application.	8	BCS-N integer 00000002 to 99999999	R
NCOLS	Number of Significant Columns in Image. This field shall contain the total number of columns of significant pixels in the image. When the product of the values of the NPPBH field and the NBPR field is greater than the value of the NCOLS field (NPPBH ∗ NBPR > NCOLS), the columns indexed with the value of the NCOLS field through (NPPBH ∗ NBPR) minus 1 shall contain fill data. NOTE: Only the columns indexed 0 through the value of NCOLS field minus 1 of the image contain significant data. The pixel fill values are determined by the application.	8	BCS-N integer 00000002 to 99999999	R

Table C-1-3. NSIF Image Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
PVTYPE	Pixel Value Type. This field shall contain an indicator of the type of computer representation used for the value for each pixel for each band in the image. Valid entries are INT for integer, B for bi-level, SI for 2's complement signed integer, R for real, and C for complex. The data bits of INT and SI values shall appear in the NSIF File in order of significance, beginning with the MSB and ending with the LSB. INT and SI data types shall be limited to 16, 32, or 64 bits. R values shall be represented according to IEEE 32 or 64-bit floating point representation (IEEE 754). C values shall be represented with the real and imaginary parts, each represented in IEEE 32 or 64-bit floating point representation (IEEE 754) and appearing in adjacent four or eight-byte blocks, first real, then imaginary. B (bi-level) pixel values shall be represented as single bits with binary value 1 or 0.	3	BCS-A INT, B, SI, R, C	R
IREP	Image Representation. This field shall contain a valid indicator of the processing required in order to display an image. Valid representation indicators are MONO for monochrome, RGB for red, green, or blue true colour, RGB/LUT for mapped colour, MULTI for multiband imagery, NODISPLY for an image not intended for display, NVECTOR and POLAR for vectors with Cartesian and polar coordinates respectively, and VPH for SAR video phase history. In addition, compressed imagery can have this field set to YCbCr601 when compressed in the ITU-R Recommendation BT.601-5 colour space using JPEG (if the value of the IC field is equal to C3). This field should be used in conjunction with the IREPBANDn fields to interpret the processing required to display each band of the image.	8	BCS-A MONO, RGB, RGB/LUT, MULTI, NODISPLY, NVECTOR, POLAR, VPH, YCbCr601 (see Table C-1-2)	R
ICAT	Image Category. This field shall contain a valid indicator of the specific category of image, raster, or grid data. The specific category of an IS reveals its intended use or the nature of its collector. Valid categories include VIS for visible imagery, SL for side-looking radar, TI for thermal infrared, FL for forward looking infrared, RD for radar, EO for electro-optical, OP for optical, HR for high resolution radar, HS for hyperspectral, CP for colour frame photography, BP for black/white frame photography, SAR for synthetic aperture radar, SARIQ for SAR radio hologram, IR for infrared, MS for multispectral, FP for fingerprints, MRI for magnetic resonance imagery, XRAY for x-rays, CAT for CAT scans, VD for video, BARO for barometric pressure, CURRENT for water current, DEPTH for water depth, and WIND for air wind charts. Valid categories for geographic products or geo-reference support data are MAP for raster maps, PAT for colour patch, LEG for legends, DTEM for elevation models, MATR for other types of matrix data, and LOCG for location grids. This field should be used in conjunction with the ISUBCATn, field to interpret the significance of each band of the image.	8	BCS-A VIS, SL, TI, FL, RD, EO, OP, HR, HS, CP, BP, SAR, SARIQ, IR, MAP, MS, FP, MRI, XRAY, CAT, VD, PAT, LEG, DTEM, MATR, LOCG, BARO, CURRENT, DEPTH, WIND (Default is VIS) (see Table C-1-2(A))	R

Table C-1-3. NSIF Image Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
ABPP	Actual Bits-per-Pixel per Band. This field shall contain the number of significant bits for the value in each band of each pixel without compression. Even when the image is compressed, the ABPP field contains the number of significant bits per pixel that were present in the image before compression. This field shall be less than or equal to the NBPP field. The number of adjacent bits within the NBPP field is used to represent the value. These representation bits shall be left justified or right justified within the bits of the NBPP field, according to the value in the PJUST field. For example, if 11-bit pixels are stored in 16 bits, this field shall contain 11 and the NBPP field shall contain 16. The default number of significant bits to be used is the value contained in the NBPP field.	2	BCS-N integer 01 to 96	R
PJUST	Pixel Justification. When the value of the ABPP field is not equal to the value of the NBPP field, this field indicates whether the significant bits are left justified (L) or right justified (R). Non-significant bits in each pixel shall contain the binary value 0.	1	BCS-A L or R (Default is R)	R
ICORDS	Image Coordinate System. This field shall contain a valid code indicating the type of coordinate system used for providing an approximate location of the image in the Image Geographic Location (IGEOLO) Field. The valid values for this field are: U for UTM expressed in Military Grid Reference System (MGRS) form, N for UTM (Northern hemisphere), S for UTM (Southern hemisphere), G for Geographic and D for Decimal Degrees. (Choice between N and S is based on hemisphere of northernmost point.) The default Geodetic reference system is WGS84. If no coordinate system is identified, a BCS Space (code 0x20) shall be used.	1	BCS-A U, G, N, S, D, or BCS Space (0x20)	<R>
IGEOLO	Image Geographic Location. This field shall contain an approximate geographic location which is not intended for analytical purposes (e.g., targeting, mensuration, distance calculation); it is intended to support general user appreciation for the image location (e.g., cataloging). The type of image corner locations are specified in the ICORDS field. The locations of the four corners of the (significant) image data shall be given in image coordinate order: (0,0), (0,MaxCol), (MaxRow), (MaxCol), (MaxRow,0). MaxCol and MaxRow shall be determined from the values contained, respectively, in the NCOLS field and the NROWS field. MaxCol is equal to the value contained in the NCOLS field minus 1 (MaxCol = NCOLS -1). Valid corner locations in geographic coordinates shall be expressed as latitude and longitude. The format ddmmssXddmmssY represents latitude and longitude. The first half ddmmssX represents degrees, minutes, and seconds of latitude with X representing North or South (N represents North or S represents South). The second half dddmmssY represents degrees, minutes, and seconds of longitude with Y representing East or West (E represents East or W represents West), respectively. Coordinates shall only be populated in the IGEOLO field to the known precision of the corner coordinates. Non-	60	BCS-A ±dd.ddd±ddd.ddd (four times) or ddmmssXdddmmssY (four times) or zzBJKeeeeennnnn (four times) or zzeeeeeennnnnnn (four times)	C

Table C-1-3. NSIF Image Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
IGEOLO (continued)	significant digits of the field shall be replaced with BCS Spaces (0x20). An example of the 60 character field with two spaces depicting the absence of arc seconds is: ddmm Xdddmm Yddmm Xdddmm Yddmm Xdddmm Yddmm Xdddmm Y. Decimal degrees are expressed as ±dd.ddd±ddd.ddd (four times) where ±dd.ddd equals latitude (+ represents northern hemisphere, - represents southern hemisphere) and ±ddd.ddd equals longitude (+ represents eastern hemisphere, - represents western hemisphere). Non-significant digits of the field shall be replaced with BCS Spaces (0x20). For the UTM Coordinate System, coordinates shall be expressed either in plain UTM coordinates or using MGRS. Plain UTM coordinates use the format zzeeeeeennnnnnn where zz represents the UTM zone number, and eeeeee, nnnnnnn represents Easting and Northing. Hemispheric (N or S) for UTM is expressed in the ICORDS field. UTM expressed in MGRS use format zzBJKeeeeennnnn where zzBJK represents the zone, band and 100 km square within the zone and eeeee, nnnnn represents residuals of Easting and Northing. NOTE: Provide the value only to the decimal places (precision) warranted by the sources and methods used to determine the location. The remaining places will be BCS Spaces (code 0x20). There is no implied accuracy associated with the data in this field. Additional information associated with precise geo-referencing (e.g., accuracy, datums, etc.) are provided in NSIF geospatial related SDEs, if applicable.			
NICOM	Number of Image Comments. This field shall contain the valid number of ICOMn field(s) that follow to be used as free text image comments.	1	BCS-N integer 0 to 9	R
.....	Start for each Image Comment ICOMn (if the value of the NICOM field is not equal to zero).			
ICOMn	Image Comment n. The field (ICOM1 through ICOMn), when present, shall contain free-form BCS-A text. They are intended for use as a single comment block and should be used that way. This field shall contain the n^{th} free text Image Comment, where n is defined as follows: 1≤n≤ the value of the NICOM field. If the Image Comment is classified, it shall be preceded by the classification, including Codeword(s). This field shall be omitted if the value in the NICOM field is BCS Zero (code 0x30).	80	BCS-A User-defined	C
.....	End or each ICOMn field; the number of loop repetitions is the value specified in the NICOMn field.			

Table C-1-3. NSIF Image Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
IC	Image Compression. This field shall contain a valid code indicating the form of compression used in representing the image data. Valid values for this field are, C1 to represent bi-level, C3 to represent JPEG, C4 to represent Vector Quantization, C5 to represent lossless JPEG, I1 to represent downsampled JPEG and NC to represent the image is not compressed. Also valid are M1, M3, M4, and M5 for compressed images, and NM for uncompressed images indicating an image that contains a Block Mask and/or a Pad Pixel Mask. The format of a mask image is identical to the format of its corresponding non-masked image except for the presence of an Image Data Mask at the beginning of the image data area. The format of the Image Data Mask is described in paragraph 18b and is shown in Table C-1-3(A). The definitions of the compression schemes associated with codes C1/M1, C3/M3, C4/M4, C5/M5, and I1 are given, respectively, in ITU-T T.4 AMD2, MIL-STD-188-198A profile of ISO/IEC 10918-1, ISO/IEC DIS 10918-3, ISO/IEC IS 12087-5, and NIMA N0106-97. C1 is found in ITU-T T.4 AMD2, C3 is found in MIL-STD-188-198A profile of ISO/IEC 10918-1 and ISO/IEC DIS 10918-3, C4 is found in ISO/IEC IS 12087-5, and C5 and I1 are found in NIMA N0106-97.	2	BCS-A NC, NM, C1, C3, C4, C5, I1, M1, M3, M4, M5	R
COMRAT	Compression Rate Code. If the Image Compression (IC) field contains, C1, C3, C4, C5, M1, M3, M4, or M5 this field shall be present and contain a code indicating the compression rate for the image. If the value of the IC field is C1 or M1, the valid codes are 1D, 2DS, and 2DH, where: 1D implies One-dimensional Coding 2DS implies Two-dimensional Coding Standard Vertical Resolution (K=2) 2DH implies Two-dimensional Coding High Vertical Resolution (K=4) Explanation of these codes can be found in ITU-T T.4 AMD2. If the value of the IC field is C3 ,M3, C5, M5 or I1 this field is used to identify the embedded quantization table(s) used by the JPEG compression algorithm. The value of this field shall be 00.0. The value 00.0 represents embedded tables and is required by JPEG. Explanation of embedded tables can be found in MIL-STD-188-198A, which is a profile of ISO/IEC 10918-1, defined in accordance with the NSIF Standards Compliance and Interoperability Test and Evaluation Program Plan. If the value of the IC field is C4 or M4, this field shall contain a value given in the form n.nn representing the number of bits-per-pixel for the compressed image. Explanation of the compression rate for Vector Quantization can be found in ISO/IEC IS 12087-5. This field is omitted if the value of the IC field is NC or NM.	4	BCS-A Depending on the value of the IC field. (see description for constraints)	C

Table C-1-3. NSIF Image Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
NBANDS	Number of Bands. This field shall contain the number of data bands within the specified image. This field and the IREP field are interrelated and they are independent of the IMODE field. The corresponding values for the IREP and NBANDS fields are: MONO, 1D, 1; 2D, 2; RGB, 3; RGB/LUT, 1; YCbCr601, 3; MULTI, ND, 2 to 9; and BCS Zero (code 0x30) for multiple band images or matrices with greater than 9 bands.	1	BCS-A 0 to 9 BCS Zero (0x30) (see description for details)	R
XBANDS	Number of Multispectral Bands. When the NBANDS field contains the value BCS Zero (code 0x30), this field shall contain the number of bands or data points comprising the multiband image. Otherwise this field shall be omitted if the value of the NBANDS field is 1 to 9.	5	BCS-N integer 00010 to 99999	C
. . . . . Start for each IREPBANDn through LUTDnm fields.				
NOTE: The IREPBANDn through LUTDnm fields repeat the number of times indicated in the NBANDS field or the XBANDS field.				
IREPBANDn	n^{th} Band Representation. This field shall contain a valid indicator of the processing required to display the n^{th} band of the image with regard to the general image type as recorded in the IREP field. The significance of each band in the image can be derived from the combination of the ICAT, and ISUBCATn fields. Valid values of the IREPBANDn field depend on the value of the IREP field. The following standard values shall apply: • R, G, B respectively for a Red, Green, Blue representation of the band, • LU for a LUT representation of the band (e.g., a three table LUT for RGB and a single table LUT for shades of grey), • M for a monochrome representation of the band, BCS Spaces (code 0x20) for a band not designated for display, but may be displayed if desired, • Y, Cb, Cr respectively for the Luminance, Chrominance (blue), and Chrominance (red) representation of a YCbCr601 (compressed case only) image, The only valid values when IREP contains MULTI are M, R, G, B, and LU: • It is strongly recommended that 3 of the multiple bands have the IREPBANDn fields populated with R, G, and B. • When bands marked as LU, R, G, B, and M are present, the RGB designated bands are the default bands for display. If R, G, B are not present, the default displayable band is the LU band. If R, G, B, or LU are not present, the default displayable band is the first M band. When no bands are marked with LU, R, G, B, or M the first three bands may be displayed as R, G, and B respectively. For consistency, multispectral images cannot have more than one band, each marked as R, G, and B. • IREPBANDn shall be filled with the M value, if the band is to be represented as monochrome. • IREPBANDn shall be filled with the LU value, if the band is to be represented using a LUT.	2	BCS-A, (Default is BCS Spaces (0x20)) Standard values are: LU, R, G, B, M, Y, Cb, Cr. Additional values are allowed through the registration process.	R

Table C-1-3. NSIF Image Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
IREPBANDn (continued)	• When IREPBANDn is filled with BCS Spaces (code 0x20), no specific representation is defined for the band, but it may be displayed if desired. Additional values are reserved for specific interpretations and shall be co-ordinated with the Custodian to regulate their use. The only valid values when IREP contains MONO images is M or BCS Spaces (code 0x20). The only valid values when IREP contains RGB images are R, G and B. The only valid value when IREP contains RGB/LUT images is LU. The only valid values when IREP contains YCbCr601 images are Y, Cb and Cr.			
ISUBCATn	n^{th} Band Subcategory. The purpose of this field is to provide the significance of the n^{th} bands of the image with regard to the specific category (ICAT field) of the overall image. The use of this field is user-defined except for the following: For MultiSpectral imagery (ICAT contains MS), HyperSpectral imagery (ICAT contains HS), and Infrared imagery (ICAT contains IR), ISUBCATn contains the wavelength including units. Where units are specified, see Annex D. When ICAT contains SAR, ISUBCATn contains I for the inphase and Q for the quadrature components or M for the magnitude and P for the phase components. When ICAT contains WIND or CURRENT, ISUBCATn contains SPEED for wind or water speed , or DIRECT for wind or water direction. For location grids, the number of bands is strictly equal to 2, consequently, there are only 2 fields, the ISUBCAT1 field and the ISUBCAT2 field. Standard values of these fields of location grids are either CGX and CGY for the cartographic X (Easting) and Y (Northing) bands, or GGX and GGY with the geographic X representing the longitude band and Y representing the latitude band. Standard values for the matrix (ICAT contains MATR) and elevation (ICAT contains DTEM) data should be taken from DIGEST Part 4 Annex B.	6	BCS-A I, Q, M, P, SPEED, DIRECT, User-defined When ICAT contains MS, HS, or IR the value range is the wave length. When ICAT contains LOCG the value range is CGX, CGY (Cartographic) GGX, GGY (Geographic). (Default is BCS Spaces (0x20))	<R>
IFCn	n^{th} Band Image Filter Condition. This field shall contain the value N (to represent none). Other values are reserved for future use.	1	BCS-A N	R
IMFLTn	n^{th} Band Standard Image Filter Code. This field is reserved for future use. It shall be filled with BCS Spaces (code 0x20).	3	BCS-A (Fill with BCS Spaces (0x20))	<R>

Table C-1-3. NSIF Image Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
NLUTSn	Number of LUTs for the n^{th} Image Band. This field shall contain the number of LUTs associated with the n^{th} band of the image. For example, if the image is a single band (the value of the NBANDS field is 1), pseudocolour image (the value of the IREP field is RGB/LUT)this field shall contain the value 3. The first, second, and third LUTs, in this case, shall map the image to the red, green, and blue display bands respectively.	1	BCS-N integer 0 to 4 (Default is BCS Zero (0x30) if no LUTs are included)	R
NELUTn	Number of LUT Entries for the n^{th} Image Band. This field shall contain the number of entries in each of the LUTs for the n^{th} image band. This field shall be omitted if the value of the NLUTSn contains BCS Zero (code 0x30).	5	BCS-N integer 00001 to 65536	C
. . . . . Start for each LUT LUTDnm.				
LUTDnm	n^{th} Image Band, m^{th} LUT. This field shall be omitted if the Number of LUTs (NLUTSn) is BCS Zero (code 0x30). Otherwise, this field shall contain the data defining the m^{th} LUT for the n^{th} image band. Each entry in the LUT is composed of one byte, ordered from MSB to LSB, representing a binary value from zero (0x00) to 255 (0xFF). To use the LUT, for each integer k, $0 \leq k \leq$ (value of the NELUTn field) - 1, the pixel value k in the n^{th} image band shall be mapped to the value of the k^{th} byte of this field (the LUT). This field supports only integer data (the value of the PVTYPE field must beINT). NOTE: This is a repeating field based on the value of the NLUTSn field. When there is more than one LUT (value of the NLUTSn field is greater than 1), the net effect is to have the LUT ordered in band sequential fashion, e.g., all the red values followed by the green values followed by the blue values.	†[3]	Binary LUT Values	C
. . . . . End or each LUTDnm field; the number of loop repetitions is the value specified in the NLUTSn field.				
. . . . . End or each IREPBANDn through LUTDnm fields; the number of loop repetitions is the value specified in the NBANDS field or the XBANDS field.				
ISYNC	Image Sync Code. This field is reserved for future use. This field shall contain BCS Zero (code 0x30)	1	BCS-A (Default is BCS Zero (0x30)) 0 = No Sync Code	R

Table C-1-3. NSIF Image Subheader (continued)

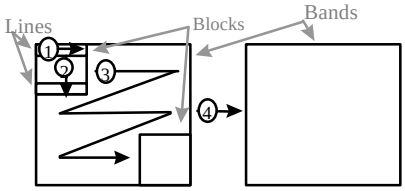
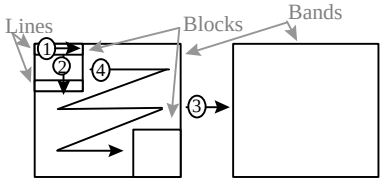
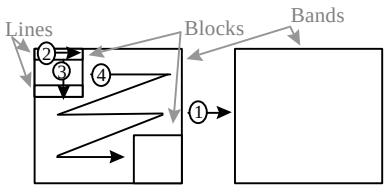
FIELD	NAME	SIZE	VALUE RANGE	TYPE
IMODE	Image Mode. This field shall indicate how the Image Pixels are stored in the NSIF File. Valid values are B, P, R, and S. The interpretation of IMODE is dependent on whether the image is JPEG compressed (value of the IC field is C3, C5, I1, M3, or M5), VQ compressed (value of the IC field is C4 or M4), or uncompressed (value of the IC field is NC or NM). a. Uncompressed. The value S indicates band sequential, where all blocks for the first band are followed by all blocks for the second band, and so on: [(block1, band1), (block2, band1), ... (blockM, band1)], [(block1, band2), (block2, band 2), ... (blockM, band2)] ... [(block1, bandN), (block2, bandN), ... (blockM, bandN)]. Note that, in each block, the pixels of the first line appears first, followed by the pixels of the second line, and so on.  Band Sequential (IMODE = S) The value B indicates band interleaved by block. This implies that within each block, the bands follow one another: [(block1, band1), (block1, band2), ...(block1, bandN)], [(block2, band1), (block2, band2), ... (block2, bandN)], ... [(blockM, band1), (blockM, band2), ... (blockM, bandN)]. Note that, in each block, the pixels of the first line appears first and the pixels of the last line appears last.  Band Interleaved by block (IMODE = B) The value P indicates band interleaved by pixel within each block: such as, for each block, one after the other, the full pixel vector (all band values) appears for every pixel in the block, one pixel after another, the block column index varying faster than the block row index.  Band Interleaved by pixel (IMODE = P) The value R indicates band interleaved by row. The ordering mechanism for this case stores the pixel	1	BCS-A B represents Band Interleaved by Block. P represents Band Interleaved by Pixel. R represents Band Interleaved by Row. S represents Band Sequential.	R

Table C-1-3. NSIF Image Subheader (continued)

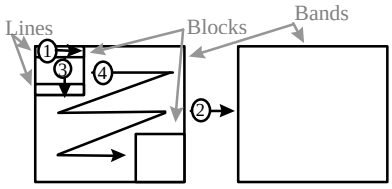
FIELD	NAME	SIZE	VALUE RANGE	TYPE
IMODE (continued)	values of each band in row sequential order. Within each block, all pixel values of the first row of the first band are followed by pixel values of the first row of the second band continuing until all values of the first row are stored. The remaining rows are stored in a similar fashion until the last row of values has been stored. Each block shall be zero filled to the next octet boundary when necessary.  Band Interleaved by row (IMODE = R) If the value of the NBANDS field is 1, the cases B and S coincide. In this case, this field shall contain B. If the Number of Blocks is 1 (the NBPR field and the NBPC field contain 1), this field shall contain B for non-interleaved by pixel, and P for interleaved by pixel. The value S is only valid for images with multiple blocks and multiple bands. b. JPEG Compressed. The presence of B, P, or S implies specific ordering of data within the JPEG image data representation. For this case the interpretation of the various values of the IMODE field is specified in the MIL-STD-188-198A profile of ISO/IEC 10918-1 and ISO/IEC DIS 10918-3. When IC contains I1; IMODE contains B. c. VQ Compressed. VQ compressed images are normally either RGB with a colour LUT or monochromatic. In either case, the image is single band, and the IMODE field defaults to B. d. Bi-Level Compressed. When the value of the IC field is C1 or M1, the value of the IMODE field is B.			
NBPR	Number of Blocks Per Row. This field shall contain the number of image blocks in a row of blocks (see paragraph 17b) in the horizontal direction. If the image consists of only a single block, this field shall contain the value one.	4	BCS-N integer 0001 to 9999	R
NBPC	Number of Blocks Per Column. This field shall contain the number of image blocks in a column of blocks (see paragraph 17b) in the vertical direction. If the image consists of only a single block, this field shall contain the value one.	4	BCS-N integer 0001 to 9999	R
NPPBH	Number of Pixels Per Block Horizontal. This field shall contain the number of pixels horizontally in each block of the image. It shall be the case that the product of the values of the NBPR field and the NPPBH field is greater than or equal to the value of the NCOLS field (NBPR $*$ NPPBH $\geq$ NCOLS).	4	BCS-N integer 0001 to 8192	R

Table C-1-3. NSIF Image Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
NPPBV	Number of Pixels Per Block Vertical. This field shall contain the number of pixels vertically in each block of the image. It shall be the case that the product of the values of the NBPC field and the NPPBV field is greater than or equal to the value of the NROWS field (NBPC * NPPBV ≥ NROWS).	4	BCS-N integer 0001 to 8192	R
NBPP	Number of Bits Per Pixel Per Band. If the IC field contains NC, NM, C4, or M4, this field shall contain the number of storage bits used for the value from each component of a pixel vector. The value in this field shall always be greater than or equal to the value of the Actual Bits Per Pixel (ABPP) Field. For example, if 11-bit pixels are stored in 16 bits, this field shall contain 16 and the ABPP field shall contain 11. If the value of the IC field is C3, M3, C5, M5, or I1, this field shall contain the value 8 or the value 12. If the value of the IC field is C1, this field shall contain the value 1.	2	BCS-N integer 01 to 96	R
IDLVL	Display Level. This field shall contain a valid value that indicates the graphic Display Level of the image relative to other displayed Segments in a composite display. The valid values are 001 to 999. The Display Level of each displayable Segment (image or graphic) within a NSIF File shall be unique; that is, each number from 001 to 999 is the Display Level of, at most, one Segment. Display Level is fully discussed in paragraph 14. The IS or GS in the NSIF File having the minimum DLVL shall have the ALVL000 (BCS Zeros (code 0x30)).	3	BCS-N integer 001 to 999	R
IALVL	Attachment Level. This field shall contain a valid value that indicates the Attachment Level of the image. Valid values for this field are BCS Zeros (code 0x30), and the Display Level value of any other image or graphic in the NSIF File. Attachment Level is fully discussed in paragraph 15. The IS or GS in the NSIF File having the minimum DLVL shall have ALVL000 (BCS Zeros (code 0x30)).	3	BCS-N integer 000 to 998 (Default is BCS Zeros (0x30))	R
ILOC	Image Location. The Image Location is specified by specifying the location of the first pixel of the first line of the image. This field shall contain the Image Location offset from the ILOC or SLOC value of the Segment to which the image is attached or from the origin of the CCS when the image is unattached (IALVL contains 000). A row or column value of 0 indicates no offset. Positive row and column values indicate offsets down and to the right, while negative row and column values indicate offsets up and to the left.	10	RRRRRCCCCC For positive row and column values RRRRR and CCCCC are both in the range 00000 to 99999. For negative row and column values RRRRR and CCCCC are both in the range -0001 to -9999.	R

Table C-1-3. NSIF Image Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
IMAG	Image Magnification. This field shall contain the magnification (or reduction) factor of the image relative to the original source image. Decimal values are used to indicate magnification, and decimal fraction values indicate reduction. For example, 2.30 indicates the original image has been magnified by a factor of 2.30 while 0.5 indicates the original image has been reduced by a factor of 2. The default value is 1.0 followed by a BCS Space (code 0x20) indicating no magnification or reduction. In addition, the following values shall be used for reductions that are reciprocals of non-negative powers of 2: /2 (for 1/2), /4 (for 1/4), /8 (for 1/8), /16 (for 1/16), /32 (for 1/32), /64 (for 1/64), /128 (for 1/128). The values are left justified and BCS Spaces (code 0x20) filled to the right.	4	BCS-A decimal value or /2 followed by 2 Spaces, /4 followed by 2 Spaces, /8 followed by 2 Spaces, /16 followed by a Space, /32 followed by a Space, /64 followed by a Space, /128 (Default is 1.0 followed by a BCS Space (0x20))	R
UDIDL	User-Defined Image Data Length. A value of BCS Zeros (code 0x30) shall denote that no TREs are included in the UDID field. If a TRE exists, the field shall contain the sum of the length of all the TREs (see paragraph 28) appearing in the UDID field plus 3 bytes (size of UDOFL field). If a TRE is too long to fit in the UDID field or the IXSHD field, it shall be put in the TRE Overflow DES with DESTAG set to the value TRE_OVERFLOW (see paragraph 29).	5	BCS-N integer 00000 or 00003 to 99999	R
UDOFL	User-Defined Overflow. If present, this field shall contain BCS Zeros (code 0x30) if the TREs in the UDID field do not overflow into a DES, or shall contain the sequence number of the DES into which they do overflow. This field shall be omitted if the field UDIDL contains BCS Zeros (code 0x30).	3	BCS-N integer 000 to 999	C
UDID	User-Defined Image Data Field. If present, this field shall contain user-defined TREs (see paragraph 28). The length of this field shall be the length specified by the value of the UDIDL field minus 3. TREs in this field for an image shall contain information pertaining specifically to the image. TREs shall appear one after the other with no intervening bytes. The first byte of this field shall be the first byte of the first TRE appearing in the field. The last byte of this field shall be the last byte of the last TRE to appear in the field. This field shall be omitted if the field UDIDL contains BCS Zeros (code 0x30).	††[3]	TREs	C
IXSHDL	Image Extended Subheader Data Length. A value of BCS Zeros (code 0x30) shall denote that no TREs are included in the IXSHD field. If a TRE exists, the field shall contain the sum of the length of all the TREs (see paragraph 28) appearing in the IXSHD field plus 3 (size of IXSOFL field) in bytes. If a TRE is too long to fit in the IXSHD field or the UDID field, it shall be put in the TRE Overflow DES with DESTAG set to the value TRE_OVERFLOW (see paragraph 29).	5	BCS-N integer 00000 or 00003 to 99999	R

Table C-1-3. NSIF Image Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
IXSOFL	Image Extended Subheader Overflow. If present, this field shall contain BCS Zeros (code 0x30) if the TREs in the IXSHD field do not overflow into a DES, or shall contain the sequence number of the DES into which they do overflow. This field shall be omitted if the IXSHDL field contains BCS Zeros (code 0x30).	3	BCS-N integer 000 to 999	C
IXSHD	Image Extended Subheader Data Field. If present, this field shall contain TREs (see paragraph 28) approved and under configuration management by the Custodian. The length of this field shall be the value specified by the IXSHDL field minus 3. TREs in this field for an image shall contain information pertaining specifically to the image. Controlled TREs shall appear one after the other in this field with no intervening bytes. The first byte of this field shall be the first byte of the first TRE appearing in the field. The last byte of this field shall be the last byte of the last TRE to appear in the field. This field shall be omitted if the IXSHDL field contains BCS Zeros (code 0x30).	†††[3]	TREs	C

†[3] A value as specified in the NELUTn field (in bytes)
††[3] A value as specified in the UDIDL field minus 3 (in bytes)
†††[3] A value as specified in the IXSHDL field minus 3 (in bytes)

Table C-1-3(A). NSIF Image Data Mask Table

TYPE R = Required, C = Conditional, < > = BCS Spaces (code 0x20) are allowed for the entire field
(† annotations are explained at the end of the table)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
IMDATOFF	Blocked Image Data Offset. This field is included if the value of the IC field isNM, M1, M3, M4, or M5. It identifies the offset from the beginning of the Image Data Mask to the first byte of the blocked image data. This offset, when used in combination with the offsets provided in the BMRnBND fields, can provide random access to any recorded image block in any image band.	4	Binary unsigned: range of values: 0 to 2^{32} -1	C
BMRLNTH	Block Mask Record Length. This field is included if the value of the IC field is NM, M1, M3, M4, or M5. It identifies the length of each Block Mask Record in bytes. When present, the length of each Block Mask Record is 4 bytes. The total length of all the Block Mask Records is equal to BMRLNTH ∗ NBPR ∗ NBPC ∗ NBANDS (one 4 byte record for each block of each band in the image). If all of the image blocks are recorded, this value may be set to 0x0000, and the conditional BMRnBNDm fields are not recorded/transmitted. Otherwise, the value may be set to 0x0004, and the conditional BMRnBNDm fields are recorded/transmitted and can be used as an offset index for each image block in each band of the image. If this field is present, but coded as 0x0000, then only a Pad Pixel Mask is included.	2	Unsigned binary integer; 0x0000 represents no Block Mask Record; 0x0004 represents Block Mask Records (4 bytes each) are present	C
TMRLNTH	Pad Pixel Mask Record Length. This field is included if the value of the IC field is NM, M1, M3, M4, or M5. It identifies the length of each Pad Pixel Mask Record in bytes. When present, the length of each Pad Pixel Mask Record is 4 bytes. The total length of the Pad Pixel Mask Records is equal to TMRLNTH ∗ NBPR ∗ NBPC ∗ NBANDS (one 4 byte record for each block for each band in the image). If none of the image blocks contain Pad Pixels, this value is set to 0x0000, and the conditional TMRnBNDm fields are not recorded/transmitted. If the value of the IC field is M3, the value shall be set to 0x0000. If this field is present, but coded as 0x0000, then a Block Mask is included.	2	Unsigned binary integer; 0x0000 represents no Pad Pixel Mask Records; 0x0004 represents Pad Pixel Mask Records (4 bytes each) are present	C
TPXCDLNTH	Pad Output Pixel Code Length. This field is included if the value of the IC field is NM, M1, M3, M4, or M5. It identifies the length in bits of the Pad Output Pixel Code. If coded as 0x0000, no transparent pixels are present, and the TPXCD field is not recorded. If the value of the IC field is M3, the value shall be set to zeros (0x0000).	2	Binary unsigned; 0x0000 represents no Pad Pixels; or Pad Pixel Code length in bits (Length must be as specified in NBPP)	C

Table C-1-3(A). NSIF Image Data Mask Table (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
TPXCD	Pad Output Pixel Code. This field is included if the value of the IC field is NM, M1, M3, M4, or M5 and the value of the TPXCDLNTH is not zeros (0x0000). It contains the Output Pixel Code that represents a Pad Pixel in the image. This value is unique within the image, and allows the user to identify Pad Pixels. The Pad Pixel Output Code length is determined by the value of the TPXCDLNTH field. If the number of bits used by the TPXCD field is less than the number of bits available for storage, the value shall be justified in accordance the value contained by the PJUST field in the Image Subheader (L for left, R for right justified).	†[3A]	Binary unsigned; range of values: 0 to 2^n -1 where n is the value contained by the TPXCDLNTH field	C
. . . . . Start for each BMRnBNDm and TMRnBNDm record.				
NOTE: The BMRnBNDm record repeats; one 4 byte record for each block of each band in the image.				
BMRnBNDm	Block n, Band m Offset. This field shall contain the n^{th} Block Mask Record of band m. It is recorded/transmitted only if the BMRLNTH field does not contain zeros (0x0000). The field shall contain an offset in bytes from the beginning of the blocked image data to the first byte of block n of band m. If block n of the image data of band m is not recorded/transmitted, the offset value is defaulted to 0xFFFFFFFF. The offsets for all blocks in band 1 are recorded followed by block offsets for band 2, etc. (band sequential). The number of BMR for each band is NBPR ∗ NBPC.	4	Binary unsigned Increment n prior to m 0≤n≤NBPR ∗ NBPC - 1 0≤m≤ max(value NBANDS field, value XBANDS field (Default is 0xFFFFFFFF if the block is not recorded)	C
TMRnBNDm	Pad Pixel n, Band m. This field shall contain the n^{th} Pad Pixel for band m. It is recorded/transmitted only if the TMRLNTH field does not contain zeros (0x0000). The field shall contain an offset in bytes from the beginning of the blocked image data to the first byte of block n of the image data of band m if block n contains Pad Pixels, or the default value 0xFFFFFFFF to indicate that this block does not contain Pad Pixels. The offsets for all blocks in band 1 are recorded followed by block offsets for band 2, etc. (band sequential). The number of TMR for each band is NBPR ∗ NBPC.	4	Binary unsigned Increment n prior to m 0≤n≤NBPR ∗ NBPC.-1 0≤m≤ max(NBANDS,XBANDS) (Default is 0xFFFFFFFF if the block does not contain Pad Pixels)	C
. . . . . End for each BMRnBNDm and TMRnBNDm record; the number of loop repetitions is the value n and m as specified in the VALUE RANGE field.				

†[3A] The length (size) of the TPXCD field is the next highest number of bytes that can contain the number of bits identified in the TPXCDLNTH field. For example, a TPXCDLNTH value of 12 (bits) would be stored in a TPXCD field with the size of 2 (bytes).

Table C-1-4. Valid NATO Security Control Markings

CODEWORD	DIGRAPH
NATO	NS
TOP SECRET	T
SECRET	S
CONFIDENTIAL	C
UNCLASSIFIED	U
ATOMAL	AL
COSMIC	CS

Note: Additional codes shall be registered with the Custodian.

Table C-1-4(A). Valid National Security Control Markings

CODEWORD	DIGRAPH
NOCONTRACT	NC
ORCON	OR
PROPIN	PI
WNINTEL	WI
LIMDIS	DS
CNWDI	CN
CRYPTO	CR
FOUO	FO
FORMREST DATA	RD
SIOP	SH
SIOP/ESI	SE
COPYRIGHT	PX
EFTO	TX
LIM OFF USE (UNCLAS)	LU
NONCOMPARTMENT	NT
PERSONAL DATA	IN
SAO	SA
SAO-1	SL
SAO-2	HA
SAO-3	HB
SAO-SI-2	SK
SAO-SI-3	HC
SAO-SI-4	HD
SPECIAL CONTROL	SC
SPECIAL INTEL	SI
WARNING NOTICE - SECURITY CLASSIFICATION IS BASED ON THE FACT OF EXISTENCE AND AVAIL OF THIS GRAPHIC	WN

Note: Additional codes shall be registered with the Custodian.

Table C-1-5. NSIF Graphic Subheader

TYPE R = Required, C = Conditional, < > = BCS Spaces (code 0x20) are allowed for the entire field
(† annotations are explained at the end of the table)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
SY	File Part Type. This field shall contain the characters SY to identify the Subheader as a Graphic Subheader.	2	BCS-A SY	R
SID	Graphic Identifier. This field shall contain a valid alphanumeric identification code associated with the graphic. The valid codes are determined by the application.	10	BCS-A User-defined	R
SNAME	Graphic Name. This field shall contain an alphanumeric name for the graphic.	20	BCS-A (Default is BCS Spaces (0x20))	<R>
SSCLAS	Graphic Security Classification. This field shall contain a valid value representing the classification level of the graphic. Valid values are T for Top Secret, S for Secret, C for Confidential, R for Restricted, U for Unclassified.	1	BCS-A T, S, C, R, or U	R
NOTE: If the value of the SSCLAS field is T, S, C, or R, then the SSCLSY field must be populated with a valid code for the security classification system used.				
SSCLSY	Graphic Security Classification System. This field shall contain valid values indicating the national or multinational security system used to classify the NSIF File. Country Codes per FIPS PUB 10-4 are used to indicate national security systems. If this field is all BCS Spaces (code 0x20), it shall imply that no Security Classification System applies to the NSIF File.	2	BCS-A BE, CA, DA, FR, GE, GR, IC, IT, LU, NL, NO, PO, SP, TU, UK, US NS represents NATO Security System Additional codes shall be registered with the Custodian. (Default is BCS Spaces (0x20))	<R>
NOTE: If any of the following fields are populated with anything other than spaces, then the SSCLSY field must be populated with a valid code for the security classification system used: SSCODE, SSREL, SSDCTP, SSDCDT, SSDCXM, SSDG, SSDGDT, SSCLTX, SSCATP, SSCAUT, SSCRSN, SSSRDT, and SSCTLN.				
SSCODE	Graphic Codewords. This field shall contain a valid indicator of the security compartments associated with the NSIF File. Values include one or more of the digraphs found in Table C-1-4, which is based on NATO C-M(55) 15 (Final) Volume I, and Table C-1-4(A). Multiple entries shall be separated by a single BCS Space (code 0x20). The selection of a relevant set of Codewords is application specific. If this field is all BCS Spaces (code 0x20), it shall imply that no Codewords apply to the NSIF File.	11	BCS-A (Default is BCS Spaces (0x20))	<R>
SSCTLH	Graphic Control and Handling. This field shall contain valid additional security Control and/or Handling instructions (caveats) associated with the NSIF File. Values include digraphs found in Table C-1-4, which is based on NATO C-M(55) 15 (Final) Volume I, and Table C-1-4(A). The digraph may indicate single or multiple caveats. The selection of a relevant caveat(s) is application specific. If this field is all BCS Spaces (code 0x20), it shall imply that no additional Control and Handling instructions apply to the NSIF File.	2	BCS-A (Default is BCS Spaces (0x20))	<R>

Table C-1-5. NSIF Graphic Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
SSREL	Graphic Releasing Instructions. This field shall contain a valid list of country and/or multilateral entity codes to which countries and/or multilateral entities the NSIF File is authorised for release. Typical values include one or more country codes as found in FIPS PUB 10-4 separated by a single BCS Space (code 0x20). If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File Release Instructions apply.	20	BCS-A (Default is BCS Spaces (0x20))	<R>
SSDCTP	Graphic Declassification Type. This field shall contain a valid indicator of the type of security declassification or downgrading instructions which apply to the NSIF File. Valid values are DD for declassify on a specific date, DE for declassify upon occurrence of an event, GD for downgrade to a specified level on a specific date, GE for downgrade to a specified level upon occurrence of an event, O for OADR, and X for exempt from automatic declassification. If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File security declassification or downgrading instructions apply.	2	BCS-A DD, DE, GD, GE, O, X (Default is BCS Spaces (0x20))	<R>
SSDCDT	Graphic Declassification Date. This field shall indicate the date on which a NSIF File is to be declassified if the value in File Declassification Type is DD. If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File Declassification Date applies.	8	CCYYMMDD (Default is BCS Spaces (0x20))	<R>
SSDCXM	Graphic Declassification Exemption. This field is not for general use but may be employed by some national systems. This field shall indicate the reason the NSIF File is exempt from automatic declassification if the value in File Declassification Type is X. Valid values are X1 through X8 and X251 through X259. X1 through X8 correspond to the declassification exemptions found in DOD 5200.1-R, paragraphs 4-202b(1) through (8) for material exempt from the 10-year rule. X251 through X259 correspond to the declassification exemptions found in DOD 5200.1-R, paragraphs 4-301a(1) through (9) for permanently valuable material exempt from the 25-year declassification system. If this field is all BCS Spaces (code 0x20), it shall imply that a NSIF File Declassification Exemption does not apply.	4	BCS-A X1 through X8 X251 through X259 (Default is BCS Spaces (0x20))	<R>
SSDG	Graphic Downgrade. This field shall indicate the classification level to which a NSIF File is to be downgraded if the values in File Declassification Type are GD or GE. Valid values are S for Secret, C for Confidential, R for Restricted. If this field is all BCS Spaces (code 0x20), it shall imply that NSIF File security downgrading does not apply.	1	BCS-A S, C, R (Default is BCS Spaces (0x20))	<R>

Table C-1-5. NSIF Graphic Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
SSDGDT	Graphic Downgrade Date. This field shall indicate the date on which a NSIF File is to be downgraded if the value in File Declassification Type is GD. If this field is all BCS Spaces (code 0x20), it shall imply that a NSIF File security downgrading date does not apply.	8	CCYYMMDD (Default is BCS Spaces (0x20))	<R>
SSCLTX	Graphic Classification Text. This field shall be used to provide additional information about NSIF File classification to include identification of a declassification or downgrading event if the values in File Declassification Type are DE or GE. It may also be used to identify multiple classification sources and/or any other special handling rules. Values are user-defined free text. If this field is all BCS Spaces (code 0x20), it shall imply that additional information about NSIF File Classification does not apply.	43	BCS-A User-defined free text (Default is BCS Spaces (0x20))	<R>
SSCATP	Graphic Classification Authority Type. This field is not for general use but may be employed by some national systems. This field shall indicate the type of authority used to classify the NSIF File. Valid values are O for original Classification Authority, D for derivative from a single source, and M for derivative from multiple sources. If this field is all BCS Spaces (code 0x20), it shall imply that NSIF File Classification Authority Type does not apply.	1	BCS-A O, D, M (Default is BCS Spaces (0x20))	<R>
SSCAUT	Graphic Classification Authority. This field is not for general use but may be employed by some national systems. This field shall identify the Classification Authority for the NSIF File dependent upon the value in File Classification Authority Type. Values are user-defined free text which should contain the following information: original Classification Authority name and position or personal ID if the value in File Classification Authority Type is O; title of the document or security classification guide used to classify the NSIF File if the value in File Classification Authority Type is D; and Deriv-Multiple if the NSIF File classification was derived from multiple sources. In the latter case, the NSIF File originator will maintain a record of the sources used in accordance with existing security directives. One of the multiple sources may also be identified in File Classification Text if desired. If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File Classification Authority applies.	40	BCS-A User-defined free text (Default is BCS Spaces (0x20))	<R>
SSCRSN	Graphic Classification Reason. This field is not for general use but may be employed by some national systems. This field shall contain values indicating the reason for classifying the NSIF File. Valid values are A through G. These correspond to the reasons for original classification per E.O. 12958, Section 1.5.(a) through (g). If this field contains a BCS Space (code 0x20), it shall imply that no NSIF File Classification Reason applies.	1	BCS-A A through G (Default is BCS Space (0x20))	<R>

Table C-1-5. NSIF Graphic Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
SSSRDT	Graphic Security Source Date. This field is not for general use but may be employed by some national systems. This field shall indicate the date of the source used to derive the classification of the NSIF File. In the case of multiple sources, the date of the most recent source shall be used. If this field is all BCS Spaces (code 0x20), it shall imply that a NSIF File Security Source Date does not apply.	8	CCYYMMDD (Default is BCS Spaces (0x20))	<R>
SSCTLN	Graphic Security Control Number. This field is not for general use but may be employed by some national systems. This field shall contain a valid Security Control Number associated with the NSIF File. The format of the Security Control Number shall be in accordance with the regulations governing the appropriate security channel(s). If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File Security Control Number applies.	15	BCS-A (Default is BCS Spaces (0x20))	<R>
ENCRYP	Encryption. This field shall contain the value BCS Zero (code 0x30) until such time as this specification is updated to define the use of other values.	1	BCS-N integer (Default is BCS Zero (0x30)) 0 implies not encrypted	R
SFMT	Graphic Type. This field shall contain a valid indicator of the representation type of the graphic. The valid value is C, which represents Computer Graphics Metafile (CGM). The graphic data contain a CGM in binary format that defines the graphic according to the specification of the profile of CGM for NSIF in ISO/IEC 8632-1. Future versions of the NSIF may include additional CGM profiles.	1	BCS-A C for CGM	R
SSTRUCT	Reserved for Future Use. Reserved.	13	BCS-N integer 0000000000000 to 9999999999999 (Default is BCS Zeros (0x30))	R
SDLVL	Display Level. This field shall contain a valid value that indicates the graphic Display Level of the graphic relative to other displayed Segments in a composite display. The valid values are 001 to 999. The Display Level of each displayable Segment (image or graphic) within a NSIF File shall be unique; that is, each number from 001 to 999 is the Display Level of, at most, one Segment. Display Level is discussed fully in paragraph 14. The GS or IS in the NSIF File having the minimum DLVL shall have ALVL000 (BCS Zeros (code 0x30)).	3	BCS-N integer 001 to 999	R
SALVL	Attachment Level. This field shall contain a valid value that indicates the Attachment Level of the graphic. Valid values for this field are BCS Zeros (code 0x30) or the DLVL value of any other image or graphic in the NSIF File. ALVL is discussed fully in paragraph 15. The GS or IS in the NSIF File having the minimum DLVL shall have ALVL000 (BCS Zeros (code 0x30)).	3	BCS-N integer 000 to 998 (Default is BCS Zeros (0x30))	R

Table C-1-5. NSIF Graphic Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
SLOC	Graphic Location. The graphic location is specified by providing the location of the graphic's origin point relative to the position (location) of the CCS, image, or graphic to which it is attached. This field shall contain the graphic location offset from the ILOC or SLOC value of the CCS, image, or graphic to which the graphic is attached or from the origin of the CCS when the graphic is unattached (SALVL000). A row or column value of 000 indicates no offset. Positive row and column values indicate offsets down and to the right, while negative row and column values indicate offsets up and to the left.	10	RRRRRCCCCC For positive row and column values RRRRR and CCCCC are both in the range 00000 to 99999. For negative row and column values RRRRR and CCCCC are both in the range -0001 to -9999.	R
SBND1	First Graphic Bound Location. This field shall contain an ordered pair of integers defining a location in Cartesian coordinates for use with CGM graphics. It is the upper left corner of the bounding box for the CGM graphic. The format is rrrrrccccc, where rrrrr is the row and ccccc is the column offset from ILOC or SLOC field value of the Segment to which the graphic is attached. If the graphic is unattached (value of the SALVL field is equal to BCS Zeros (code 0x30)), rrrrr and ccccc represent offsets from the origin of the coordinate system that is common to all images and graphics in the NSIF File having the value of BCS Zeros (code 0x30) in the SALVL field. The range for rrrrr and ccccc shall be -9999 to 99999.	10	BCS-N integer rrrrrccccc with -9999≤rrrrr≤99999 -9999≤ccccc≤99999 (Default is BCS Zeros (0x30))	R
SCOLOR	Graphic Colour. The value of this field depends on the value of the SFMT field. The only value allowed for a CGM graphic (SFMT field value is C) are: • C if the CGM contains any colour pieces, • M if it is monochrome (i.e., black, white, or levels of grey)	1	BCS-A C, M	R
SBND2	Second Graphic Bound Location. This field shall contain an ordered pair of integers defining a location in Cartesian coordinates for use with CGM graphics. It is the lower right corner of the bounding box for the CGM graphic. The format is rrrrrccccc, where rrrrr is the row and ccccc is the column offset from ILOC or SLOC field value of the Segment to which the graphic is attached. If the graphic is unattached (SALVL field value is BCS Zeros (code 0x30)), rrrrr and ccccc represent offsets from the origin of the coordinate system that is common to all images and graphics in the NSIF File having the value of BCS Zeros (code 0x30) in the SALVL field. The range for rrrrr and ccccc shall be -9999 to 99999.	10	BCS-N integer rrrrrccccc with -9999≤rrrrr≤99999 -9999≤ccccc≤99999 (Default is BCS Zeros (0x30))	R
SRES2	Reserved for Future Use. This field is reserved for future use. The default value shall be BCS Zeros (code 0x30).	2	BCS-N integer 00 to 99 (Default is BCS Zeros (0x30))	R

Table C-1-5. NSIF Graphic Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
SXSHDL	Graphic Extended Subheader Data Length. A value of BCS Zeros (code 0x30) shall denote that no TREs are included in the Graphic Subheader. If a TRE exists, the field shall contain the sum of the length of all the TREs (see paragraph 28) appearing in the SXSHD field plus 3 (SXSOFL field size). If a TRE is too long to fit in the SXSHD field, it shall be put in the TRE Overflow DES with DESTAG set to the value TRE_OVERFLOW (see paragraph 29).	5	BCS-N integer 00000 or 00003 to 09741 (Default is BCS Zeros (0x30))	R
SXSOFL	Graphic Extended Subheader Overflow. If present, this field shall contain BCS Zeros (code 0x30) if the TREs in the SXSHD field do not overflow into a DES or shall contain the sequence number of the DES into which they do overflow. This field shall be omitted if the SXSHDL field contains BCS Zeros (code 0x30).	3	BCS-N integer 000 to 999	C
SXSHD	Graphic Extended Subheader Data. If present, this field shall contain TREs (see paragraph 28) approved and under configuration management by the Custodian. The length of this field shall be the value specified by the SXSHDL field minus 3. TREs in this field for a graphic shall contain information pertaining specifically to the graphic. TREs shall appear one after the other in this field with no intervening bytes. The first byte of this field shall be the first byte of the first TRE appearing in the field. The last byte of this field shall be the last byte of the last TRE to appear in the field. This field shall be omitted if the SXSHDL field contains BCS Zeros (code 0x30).	†[5]	TREs	C

†[5] A value as specified in the SXSHDL field minus 3 (in bytes)

Table C-1-6. NSIF Text Subheader

TYPE R = Required, C = Conditional, < > = BCS Spaces (code 0x20) are allowed for the entire field
(† annotations are explained at the end of the table)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
TE	File Part Type. This field shall contain the characters TE to identify the Subheader as a Text Subheader.	2	BCS-A TE	R
TEXTID	Text Identifier. This field shall contain a valid alphanumeric identification code associated with the TS. The valid codes are determined by the application.	7	BCS-A User-defined	R
TXTALVL	Text Attachment Level. This field shall contain a valid value that indicates the Attachment Level of the text. Valid values for this field are 000 (BCS Zeros (code 0x30)) or the Display Level value of any image or graphic in the NSIF File.	3	BCS-N integer 000 to 998 (Default is BCS Zeros (0x30))	R
TXTDT	Text Date and Time. This field shall contain the time (UTC) of origination of the text in the format CCYYMMDDhhmmss, where CC is the first two digits of the century (00 to 99), YY is the last two digits of the year (00 to 99), MM is the month (01 to 12), DD is the day (01 to 31), hh is the hour (00 to 23), mm is the minute (00 to 59), and ss is the second (00 to 59). UTC (Zulu) is assumed to be the time zone designator to express the time of day.	14	BCS-N integer CCYYMMDDhhmmss	R
TXTITL	Text Title. This field shall contain the title of the TS.	80	BCS-A (Default is BCS Spaces (0x20))	<R>
TSCLAS	Text Security Classification. This field shall contain a valid value representing the classification level of the text. Valid values are T for Top Secret, S for Secret, C for Confidential, R for Restricted, U for Unclassified.	1	BCS-A T, S, C, R, or U	R
NOTE: If the value of the TSCLAS field is T, S, C, or R, then the TSCLSY field must be populated with a valid code for the security classification system used.				
TSCLSY	Text Security Classification System. This field shall contain valid values indicating the national or multinational security system used to classify the NSIF File. Country Codes per FIPS PUB 10-4 are used to indicate national security systems. If this field is all BCS Spaces (code 0x20), it shall imply that no Security Classification System applies to the NSIF File.	2	BCS-A BE, CA, DA, FR, GE, GR, IC, IT, LU, NL, NO, PO, SP, TU, UK, US NS represents NATO Security System Additional codes shall be registered with the Custodian. (Default is BCS Spaces (0x20))	<R>
NOTE: If any of the following fields are populated with anything other than spaces, then the TSCLSY field must be populated with a valid code for the security classification system used: TSCODE, TSREL, TSDCTP, TSDCDT, TSDCXM, TSDG, TSDGDT, TSCLTS, TSCATP, TSCAUT, TSCRSN, TSSRDT, and TSCTLN.				
TSCODE	Text Codewords. This field shall contain a valid indicator of the security compartments associated with the NSIF File. Values include one or more of the digraphs found in Table C-1-4, which is based on NATO C-M(55) 15 (Final) Volume I, and Table C-1-4(A). Multiple entries shall be separated by a single BCS Space (code 0x20). The selection of a relevant set of Codewords is application specific. If this field is all BCS Spaces (code 0x20), it shall imply that no Codewords apply to the NSIF File.	11	BCS-A (Default is BCS Spaces (0x20))	<R>

Table C-1-6. NSIF Text Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
TSCTLH	Text Control and Handling. This field shall contain valid additional security Control and/or Handling instructions (caveats) associated with the NSIF File. Values include digraphs found in Table C-1-4, which is based on NATO C-M(55) 15 (Final) Volume I, and Table C-1-4(A). The digraph may indicate single or multiple caveats. The selection of a relevant caveat(s) is application specific. If this field is all BCS Spaces (code 0x20), it shall imply that no additional Control and Handling instructions apply to the NSIF File.	2	BCS-A (Default is BCS Spaces (0x20))	<R>
TSREL	Text Releasing Instructions. This field shall contain a valid list of countries outside of NATO to which the NSIF File is authorised for release. Typical values include one or more country codes as found in FIPS PUB 10-4 separated by a single BCS Space (code 0x20). If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File Release Instructions apply.	20	BCS-A (Default is BCS Spaces (0x20))	<R>
TSDCTP	Text Declassification Type. This field shall contain a valid indicator of the type of security declassification or downgrading instructions which apply to the NSIF File. Valid values are DD for declassify on a specific date, DE for declassify upon occurrence of an event, GD for downgrade to a specified level on a specific date, GE for downgrade to a specified level upon occurrence of an event, O for OADR, and X for exempt from automatic declassification. If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File security declassification or downgrading instructions apply.	2	BCS-A DD, DE, GD, GE, O, X (Default is BCS Spaces (0x20))	<R>
TSDCDT	Text Declassification Date. This field shall indicate the date on which a NSIF File is to be declassified if the value in File Declassification Type is DD. If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File Declassification Date applies.	8	CCYYMMDD (Default is BCS Spaces (0x20))	<R>
TSDCXM	Text Declassification Exemption. This field is not for general use but may be employed by some national systems. This field shall indicate the reason the NSIF File is exempt from automatic declassification if the value in File Declassification Type is X. Valid values are X1 through X8 and X251 through X259. X1 through X8 correspond to the declassification exemptions found in DOD 5200.1-R, paragraphs 4-202b(1) through (8) for material exempt from the 10-year rule. X251 through X259 correspond to the declassification exemptions found in DOD 5200.1-R, paragraphs 4-301a(1) through (9) for permanently valuable material exempt from the 25-year declassification system. If this field is all BCS Spaces (code 0x20), it shall imply that a NSIF File Declassification Exemption does not apply.	4	BCS-A X1 through X8 X251 through X259 (Default is BCS Spaces (0x20))	<R>

Table C-1-6. NSIF Text Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
TSDG	Text Downgrade. This field shall indicate the classification level to which a NSIF File is to be downgraded if the values in File Declassification Type are GD or GE. Valid values are S for Secret, C for Confidential, R for Restricted. If this field contains a BCS Space (code 0x20), it shall imply that NSIF File security downgrading does not apply.	1	BCS-A S, C, R (Default is BCS Space (0x20))	<R>
TSDGDT	Text Downgrade Date. This field shall indicate the date on which a NSIF File is to be downgraded if the value in File Declassification Type is GD. If this field is all BCS Spaces (code 0x20), it shall imply that a NSIF File security Downgrading Date does not apply.	8	CCYYMMDD (Default is BCS Spaces (0x20))	<R>
TSCLTX	Text Classification Text. This field shall be used to provide additional information about NSIF File Classification to include identification of a declassification or downgrading event if the values in File Declassification Type are DE or GE. It may also be used to identify multiple classification sources and/or any other special handling rules. Values are user-defined free text. If this field is all BCS Spaces (code 0x20), it shall imply that additional information about NSIF File Classification does not apply.	43	BCS-A User-defined free text (Default is BCS Spaces (0x20))	<R>
TSCATP	Text Classification Authority Type. This field is not for general use but may be employed by some national systems. This field shall indicate the type of authority used to classify the NSIF File. Valid values are O for original Classification Authority, D for derivative from a single source, and M for derivative from multiple sources. If this field contains a BCS Space (code 0x20), it shall imply that NSIF File Classification Authority Type does not apply.	1	BCS-A O, D, M (Default is BCS Space (0x20))	<R>
TSCAUT	Text Classification Authority. This field is not for general use but may be employed by some national systems. This field shall identify the Classification Authority for the NSIF File dependent upon the value in File Classification Authority Type. Values are user-defined free text which should contain the following information: original Classification Authority name and position or personal ID if the value in File Classification Authority Type is O; title of the document or security classification guide used to classify the NSIF File if the value in File Classification Authority Type is D; and Deriv-Multiple if the NSIF File classification was derived from multiple sources. In the latter case, the NSIF File originator will maintain a record of the sources used in accordance with existing security directives. One of the multiple sources may also be identified in File Classification Text if desired. If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File Classification Authority applies.	40	BCS-A User-defined free text (Default is BCS Spaces (0x20))	<R>

Table C-1-6. NSIF Text Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
TSCRSN	Text Classification Reason. This field is not for general use but may be employed by some national systems. This field shall contain a value indicating the reason for classifying the NSIF File. Valid values are A through G. These correspond to the reasons for original classification per E.O. 12958, Section 1.5.(a) through (g). If this field contains a BCS Space (code 0x20), it shall imply that no NSIF File Classification Reason applies.	1	BCS-A A through G (Default is BCS Space (0x20))	<R>
TSSRDT	Text Security Source Date. This field is not for general use but may be employed by some national systems. This field shall indicate the date of the source used to derive the classification of the NSIF File. In the case of multiple sources, the date of the most recent source shall be used. If this field is all BCS Spaces (code 0x20), it shall imply that a NSIF File Security Source Date does not apply.	8	CCYYMMDD (Default is BCS Spaces (0x20))	<R>
TSCTLN	Text Security Control Number. This field is not for general use but may be employed by some national systems. This field shall contain a valid Security Control Number associated with the NSIF File. The format of the Security Control Number shall be in accordance with the regulations governing the appropriate security channel(s). If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File Security Control Number applies.	15	BCS-A (Default is BCS Spaces (0x20))	<R>
ENCRYP	Encryption. This field shall contain the value BCS Zero (code 0x30) until such time as this specification is updated to define the use of other values.	1	BCS-N integer (Default is BCS Zero (0x30)) 0 implies not encrypted	R
TXTFMT	Text Format. This field shall contain a valid three-character code indicating the format or type of text data. Valid codes are MTF to indicate NATO MTF (refer to STANAG 5500 for examples of the NATO MTF format), STA to indicate BCS-A, UC2 to indicate 2-octet coded characters, and UT1 to indicate 1-octet coded characters, Basic Latin and Latin Supplement 1. Refer to section 3 for additional discussion of standards and the BCS.	3	BCS-A MTF, STA, UC2, UT1	R
TXSHDL	Text Extended Subheader Data Length. A value of BCS Zeros (code 0x30) shall denote that no TREs are included in the Text Subheader. If a TRE exists, the field shall contain the sum of the length of all the TREs (see paragraph 28) appearing in the TSXHD field plus 3 (TSXOFL field size). If a TRE is too long to fit in the TXSHD field, it shall be put in the TRE Overflow DES with DESTAG set to the value TRE_OVERFLOW (see paragraph 29).	5	BCS-N integer 00000 or 00003 to 09717 (Default is BCS Zeros (0x30))	R
TXSOFL	Text Extended Subheader Overflow. If present, this field shall contain BCS Zeros (code 0x30) if the TREs in the TXSHD field do not overflow into a DES, or shall contain the sequence number of the DES into which they do overflow. This field shall be omitted if the TXSHDL field contains BCS Zeros (code 0x30).	3	BCS-N integer (000 to 999)	C

Table C-1-6. NSIF Text Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
TXSHD	Text Extended Subheader Data Field. If present, this field shall contain TREs (see paragraph 28) approved and under configuration management by the Custodian. The length of this field shall be the length specified by the value of the TXSHDL field minus 3. TREs in this field shall contain information pertaining specifically to the text. TREs shall appear one after the other in this field with no intervening bytes. The first byte of this field shall be the first byte of the first TRE appearing in the field. The last byte of this field shall be the last byte of the last TRE to appear in the field. This field shall be omitted if the TXSHDL field contains BCS Zeros (code 0x30).	†[6]	BCS-A	C

†[6] A value as specified in the TXSHDL field minus 3 (in bytes)

Table C-1-7. Controlled and Registered Tagged Record Extension (TRE) Format

TYPE R = Required, C = Conditional, < > = BCS Spaces (code 0x20) are allowed for the entire field
(† annotations are explained at the end of the table)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
RETAG or CETAG	Unique Extension Type Identifier. This field shall contain a valid alphanumeric ID that is properly registered with the Custodian.	6	BCS-A	R
REL or CEL	Length of REDATA. This field shall contain the length in bytes of the data contained in REDATA or CETAG. The Tagged Record's length is 11 plus the size of theREL field or the CEL field.	5	BCS-N integer (00001 to 99985)	R
REDATA or CEDATA where appropriate	User-Defined Data. This field shall contain data of either binary or character data types defined by and formatted according to user specification. The length of this field shall not cause any other NSIF field length limits to be exceeded, but is otherwise fully user-defined.	†[7]	User-defined	R

†[7] A value as indicated in REL field or CEL field (in bytes)

Table C-1-8. NSIF Data Extension Segment (DES) Subheader

TYPE R = Required, C = Conditional, < > = BCS Spaces (code 0x20) are allowed for the entire field
(† annotations are explained at the end of the table)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
DE	File Part Type. This field shall contain the characters DE to identify the Subheader as a DES Subheader.	2	BCS-A DE	R
DESTAG	Unique DES Type Identifier. This field shall contain a valid alphanumeric ID that is properly registered with the Custodian.	25	BCS-A (Registered value only)	R
DESVER	Version of the Data Field Definition. This field shall contain the alphanumeric version number of the use of the Tag. The version number is assigned as part of the registration process.	2	BCS-N integer 01 to 99	R
DECLAS	Data Extension File Security Classification. This field shall contain a valid value representing the classification level of the entire NSIF File. Valid values are T for Top Secret, S for Secret, C for Confidential, R for Restricted, or U for Unclassified.	1	BCS-A T, S, C, R, or U	R
NOTE: If the value of the DESCLAS field is T, S, C, or R, then the DESCLSY field must be populated with a valid code for the security classification system used.				
DESCLSY	DES Security Classification System. This field shall contain valid values indicating the national or multinational security system used to classify the NSIF File. Country Codes per FIPS PUB 10-4 are used to indicate national security systems. If this field is all BCS Spaces (code 0x20), it shall imply that no Security Classification System applies to the NSIF File.	2	BCS-A BE, CA, DA, FR, GE, GR, IC, IT, LU, NL, NO, PO, SP, TU, UK, US NS represents NATO Security System Additional codes shall be registered with the Custodian. (Default is BCS Spaces (0x20))	<R>
NOTE: If any of the following fields are populated with anything other than spaces, then the DESCLSY field must be populated with a valid code for the security classification system used: DESCODE, DESREL, DESDCTP, DESDCDT, DESDCXM, DESDG, DESDGDT, DESCLDES, DESCATP, DESCAUT, DESCRSN, DESSRDT, and DESCTLN.				
DESCODE	DES Codewords. This field shall contain a valid indicator of the security compartments associated with the NSIF File. Values include one or more of the digraphs found in Table C-1-4, which is based on NATO C-M(55) 15 (Final) Volume I, and Table C-1-4(A). Multiple entries shall be separated by a single BCS Space (code 0x20). The selection of a relevant set of Codewords is application specific. If this field is all BCS Spaces (code 0x20), it shall imply that no Codewords apply to the NSIF File.	11	BCS-A (Default is BCS Spaces (0x20))	<R>
DESCTLH	DES Control and Handling. This field shall contain valid additional security control and/or handling instructions (caveats) associated with the NSIF File. Values include digraphs found in Table C-1-4, which is based on NATO C-M(55) 15 (Final) Volume I, and Table C-1-4(A). The digraph may indicate single or multiple caveats. The selection of a relevant caveat(s) is application specific. If this field is all BCS Spaces (code 0x20), it shall imply that no additional Control and Handling instructions apply to the NSIF File.	2	BCS-A (Default is BCS Spaces (0x20))	<R>

Table C-1-8. NSIF Data Extension Segment (DES) Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
DESREL	DES Releasing Instructions. This field shall contain a valid list of countries outside of NATO to which the NSIF File is authorised for release. Typical values include one or more country codes as found in FIPS PUB 10-4 separated by a single BCS Space (code 0x20). If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File Release Instructions apply.	20	BCS-A (Default is BCS Spaces (0x20))	<R>
DESDCTP	DES Declassification Type. This field shall contain a valid indicator of the type of security declassification or downgrading instructions which apply to the NSIF File. Valid values are DD for declassify on a specific date, DE for declassify upon occurrence of an event, GD for downgrade to a specified level on a specific date, GE for downgrade to a specified level upon occurrence of an event, O for OADR, and X for exempt from automatic declassification. If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File security declassification or downgrading instructions apply.	2	BCS-A DD, DE, GD, GE, O, X (Default is BCS Spaces (0x20))	<R>
DESDCDT	DES Declassification Date. This field shall indicate the date on which a NSIF File is to be declassified if the value in File Declassification Type is DD. If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File Declassification Date applies.	8	CCYYMMDD (Default is BCS Spaces (0x20))	<R>
DESDCXM	DES Declassification Exemption. This field is not for general use but may be employed by some national systems. This field shall indicate the reason the NSIF File is exempt from automatic declassification if the value in File Declassification Type is X. Valid values are X1 through X8 and X251 through X259. X1 through X8 correspond to the declassification exemptions found in DOD 5200.1-R, paragraphs 4-202b(1) through (8) for material exempt from the 10-year rule. X251 through X259 correspond to the declassification exemptions found in DOD 5200.1-R, paragraphs 4-301a(1) through (9) for permanently valuable material exempt from the 25-year declassification system. If this field is all BCS Spaces (code 0x20), it shall imply that a NSIF File Declassification Exemption does not apply.	4	BCS-A X1 through X8 X251 through X259 (Default is BCS Spaces (0x20))	<R>
DESDG	DES Downgrade. This field shall indicate the classification level to which a NSIF File is to be downgraded if the values in File Declassification Type are GD or GE. Valid values are S for Secret, C for Confidential, R for Restricted. If this field contains a BCS Space (code 0x20), it shall imply that NSIF File security downgrading does not apply.	1	BCS-A S, C, R (Default is BCS Space (0x20))	<R>
DESDGDT	DES Downgrade Date. This field shall indicate the date on which a NSIF File is to be downgraded if the value in File Declassification Type is GD. If this field is all BCS Spaces (code 0x20), it shall imply that a NSIF File security Downgrading Date does not apply.	8	CCYYMMDD (Default is BCS Spaces (0x20))	<R>

Table C-1-8. NSIF Data Extension Segment (DES) Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
DESCLTX	DES Classification Text. This field shall be used to provide additional information about NSIF File Classification to include identification of a declassification or downgrading event if the values in File Declassification Type are DE or GE. It may also be used to identify multiple classification sources and/or any other special handling rules. Values are user-defined free text. If this field is all BCS Spaces (code 0x20), it shall imply that additional information about NSIF File Classification does not apply.	43	BCS-A User-defined free text (Default is BCS Spaces (0x20))	<R>
DESCATP	DES Classification Authority Type. This field is not for general use but may be employed by some national systems. This field shall indicate the type of authority used to classify the NSIF File. Valid values are O for original Classification Authority, D for derivative from a single source, and M for derivative from multiple sources. If this field contains a BCS Space (code 0x20), it shall imply that NSIF File Classification Authority Type does not apply.	1	BCS-A O, D, M (Default is BCS Space (0x20))	<R>
DESCAUT	DES Classification Authority. This field is not for general use but may be employed by some national systems. This field shall identify the Classification Authority for the NSIF File dependent upon the value in File Classification Authority Type. Values are user-defined free text which should contain the following information: original Classification Authority name and position or personal ID if the value in File Classification Authority Type is O; title of the document or security classification guide used to classify the NSIF File if the value in File Classification Authority Type is D; and Deriv-Multiple if the NSIF File classification was derived from multiple sources. In the latter case, the NSIF File originator will maintain a record of the sources used in accordance with existing security directives. One of the multiple sources may also be identified in File Classification Text if desired. If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File Classification Authority applies.	40	BCS-A User-defined free text (Default is BCS Spaces (0x20))	<R>
DESCRSN	DES Classification Reason. This field is not for general use but may be employed by some national systems. This field shall contain values indicating the reason for classifying the NSIF File. Valid values are A through G. These correspond to the reasons for original classification per E.O. 12958, Section 1.5.(a) through (g). If this field contains a BCS Spaces (code 0x20), it shall imply that no NSIF File Classification Reason applies.	1	BCS-A A through G (Default is BCS Space (0x20))	<R>
DESSRDT	DES Security Source Date. This field is not for general use but may be employed by some national systems. This field shall indicate the date of the source used to derive the classification of the NSIF File. In the case of multiple sources, the date of the most recent source shall be used. If this field is all BCS Spaces (code 0x20), it shall imply that a NSIF File Security Source Date does not apply.	8	CCYYMMDD (Default is BCS Spaces (0x20))	<R>

Table C-1-8. NSIF Data Extension Segment (DES) Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
DESCTLN	DES Security Control Number. This field is not for general use but may be employed by some national systems. This field shall contain a valid Security Control Number associated with the NSIF File. The format of the Security Control Number shall be in accordance with the regulations governing the appropriate security channel(s). If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File Security Control Number applies.	15	BCS-A (Default is BCS Spaces (0x20))	<R>
DESOFLW	DES Overflowed Header Type. This field shall be present if DESTAG is set to the value TRE_OVERFLOW. Its presence indicates that the DES contains a TRE that would not fit in the NSIF File Header or Segment Subheader where it would ordinarily be located. Its value indicates the Segment type to which the enclosed Tagged Record is relevant.	6	BCS-A XHD, IXSHD, SXSHD, TXSHD, UDHD, UDID	C
DESITEM	DES Data Segment Overflowed. This field shall be present if the DESOFLW field is present. It shall contain the number of the Data Segment in the NSIF File, of the type indicated by the value of theDESOFLW field to which the TREs in the Segment apply. For example, if the value of the DESOFLW field is UDID and the value of the DESITEM field is 003, then the TREs in the Segment apply to the third image in the NSIF File. If the value of the DESOFLW field is UDHD, the value of the DESITEM shall be BCS Zeros (code 0x30).	3	BCS-N integer 000 to 999	C
DESSHL	DES Length of User-Defined Subheader. This field shall contain the number of bytes in the DESSHF field. If this field contains BCS Zeros (code 0x30), the DESSHF field shall not appear in the DES Subheader. This field shall contain BCS Zeros (code 0x30) if the value of the DESTAG field indicates CEs or REs.	4	BCS-N integer 0000 to 9999 (Default is BCS Zeros (0x30))	R
DESSHF	DES User-Defined Subheader Fields. This field shall contain user-defined fields. Data in this field shall be alphanumeric, formatted according to user specification.	†[8]	BCS-A User-defined	C
DESDATA	DES User-Defined Data Field. This field shall contain data of either binary or character types defined by and formatted according to the user's specification. However, if the DESTAG is set to the value TRE_OVERFLOW the Tagged Records shall appear according to their definition with no intervening bytes. The length (size) of this field shall not cause any other NSIF field length (size) limits to be exceeded, but is otherwise fully user-defined.	††[8]	User-defined.	R

†[8] Value of the DESSHL field (in bytes)

††[8] Determined by user. If the DESTAG is set to the value TRE_OVERFLOW, this signifies the sum of the lengths of the included Tagged Records.

Table C-1-9. NSIF Reserved Extension Segment (RES) Subheader

TYPE R = Required, C = Conditional, < > = BCS Spaces (code 0x20) are allowed for the entire field
(† annotations are explained at the end of the table)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
RE	File Part Type. This field shall contain the characters RE to identify the Subheader as a Reserved Extension Subheader.	2	BCS-A RE	R
RESTAG	Unique RES Type Identifier. This field shall contain a valid alphanumeric ID that is properly registered with the Custodian.	25	BCS-A (Registered value only)	R
RESVER	Version of the Data Definition. This field shall contain the alphanumeric version number of the use of the Tag. The version number is assigned as part of the registration process.	2	BCS-N integer 01 to 99	R
RECLAS	Reserved Extension File Security Classification. This field shall contain a valid value representing the classification level of the entire NSIF File. Valid values are T for Top Secret, S for Secret, C for Confidential, R for Restricted, or U for Unclassified.	1	BCS-A T, S, C, R, or U	R
NOTE: If the value of the RECLAS field is T, S, C, or R, then the RECLSY field must be populated with a valid code for the security classification system used.				
RECLSY	RES Security Classification System. This field shall contain valid values indicating the national or multinational security system used to classify the NSIF File. Country Codes per FIPS PUB 10-4 are used to indicate national security systems. If this field is all BCS Spaces (code 0x20), it shall imply that no Security Classification System applies to the NSIF File.	2	BCS-A BE, CA, DA, FR, GE, GR, IC, IT, LU, NL, NO, PO, SP, TU, UK, US NS represents NATO Security System Additional codes shall be registered with the Custodian. (Default is BCS Spaces (0x20))	<R>
NOTE: If any of the following fields are populated with anything other than spaces, then the RECLSY field must be populated with a valid code for the security classification system used: RECODE, REREL, REDCTP, REDCDT, REDCXM, REDG, REDGDT, RECLTX, RECATP, RECAUT, RECRSN, RESRDT, and RECTLN.				
RECODE	RES Codewords. This field shall contain a valid indicator of the security compartments associated with the NSIF File. Values include one or more of the digraphs found in Table C-1-4, which is based on NATO C-M(55) 15 (Final) Volume I, and Table C-1-4(A). Multiple entries shall be separated by a single BCS Space (code 0x20). The selection of a relevant set of Codewords is application specific. If this field is all BCS Spaces (code 0x20), it shall imply that no Codewords apply to the NSIF File.	11	BCS-A (Default is BCS Spaces (0x20))	<R>
RECTLH	RES Control and Handling. This field shall contain valid additional security Control and/or Handling instructions (caveats) associated with the NSIF File. Values include digraphs found in Table C-1-4, which is based on NATO C-M(55) 15 (Final) Volume I, and Table C-1-4(A). The digraph may indicate single or multiple caveats. The selection of a relevant caveat(s) is application specific. If this field is all BCS Spaces (code 0x20), it shall imply that no additional Control and Handling instructions apply to the NSIF File.	2	BCS-A (Default is BCS Spaces (0x20))	<R>

Table C-1-9. NSIF Reserved Extension Segment (RES) Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
REREL	RES Releasing Instructions. This field shall contain a valid list of countries outside of NATO to which the NSIF File is authorised for release. Typical values include one or more country codes as found in FIPS PUB 10-4 separated by a single BCS Space (code 0x20). If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File Release Instructions apply.	20	BCS-A (Default is BCS Spaces (0x20))	<R>
REDCTP	RES Declassification Type. This field shall contain a valid indicator of the type of security declassification or downgrading instructions which apply to the NSIF File. Valid values are DD for declassify on a specific date, DE for declassify upon occurrence of an event, GD for downgrade to a specified level on a specific date, GE for downgrade to a specified level upon occurrence of an event, O for OADR, and X for exempt from automatic declassification. If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File security declassification or downgrading instructions apply.	2	BCS-A DD, DE, GD, GE, O, X (Default is BCS Spaces (0x20))	<R>
REDCDT	RES Declassification Date. This field shall indicate the date on which a NSIF File is to be declassified if the value in File Declassification Type is DD. If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File Declassification Date applies.	8	CCYYMMDD (Default is BCS Spaces (0x20))	<R>
REDCXM	RES Declassification Exemption. This field is not for general use but may be employed by some national systems. This field shall indicate the reason the NSIF File is exempt from automatic declassification if the value in File Declassification Type is X. Valid values are X1 through X8 and X251 through X259. X1 through X8 correspond to the declassification exemptions found in DOD 5200.1-R, paragraphs 4-202b(1) through (8) for material exempt from the 10-year rule. X251 through X259 correspond to the declassification exemptions found in DOD 5200.1-R, paragraphs 4-301a(1) through (9) for permanently valuable material exempt from the 25-year declassification system. If this field is all BCS Spaces (code 0x20), it shall imply that a File Declassification Exemption does not apply.	4	BCS-A X1 through X8, X251 through X259, (Default is BCS Spaces (0x20))	<R>
REDG	RES Downgrade. This field shall indicate the classification level to which a NSIF File is to be downgraded if the values in File Declassification Type are GD or GE. Valid values are S for Secret, C for Confidential, R for Restricted. If this field contains a BCS Space (code 0x20), it shall imply that NSIF File security downgrading does not apply.	1	BCS-A S, C, R (Default is BCS Space (0x20))	<R>
REDGDT	RES Downgrade Date. This field shall indicate the date on which a NSIF File is to be downgraded if the value in File Declassification Type is GD. If this field is all BCS Spaces (code 0x20), it shall imply that a NSIF File security downgrading date does not apply.	8	CCYYMMDD (Default is BCS Spaces (0x20))	<R>

Table C-1-9. NSIF Reserved Extension Segment (RES) Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
RECLTX	RES Classification Text. This field shall be used to provide additional information about NSIF File Classification to include identification of a declassification or downgrading event if the values in File Declassification Type are DE or GE. It may also be used to identify multiple classification sources and/or any other special handling rules. Values are user-defined free text. If this field is all BCS Spaces (code 0x20), it shall imply that additional information about NSIF File Classification does not apply.	43	BCS-A User-defined free text (Default is BCS Spaces (0x20))	<R>
RECATP	RES Classification Authority Type. This field is not for general use but may be employed by some national systems. This field shall indicate the type of authority used to classify the NSIF File. Valid values are O for original Classification Authority, D for derivative from a single source, and M for derivative from multiple sources. If this field contains a BCS Space (code 0x20), it shall imply that NSIF File Classification Authority Type does not apply.	1	BCS-A O, D, M (Default is BCS Space (0x20))	<R>
RECAUT	RES Classification Authority. This field is not for general use but may be employed by some national systems. This field shall identify the Classification Authority for the NSIF File dependent upon the value in File Classification Authority Type. Values are user-defined free text which should contain the following information: original Classification Authority name and position or personal ID if the value in File Classification Authority Type is O; title of the document or security classification guide used to classify the NSIF File if the value in File Classification Authority Type is D; and Deriv-Multiple if the NSIF File classification was derived from multiple sources. In the latter case, the NSIF File originator will maintain a record of the sources used in accordance with existing security directives. One of the multiple sources may also be identified in File Classification Text if desired. If this field is all BCS Spaces (code 0x20), it shall imply that no NSIF File Classification Authority applies.	40	BCS-A User-defined free text (Default is BCS Spaces (0x20))	<R>
RECRSN	RES Classification Reason. This field is not for general use but may be employed by some national systems. This field shall contain values indicating the reason for classifying the NSIF File. Valid values are A through G. These correspond to the reasons for original classification per E.O. 12958, Section 1.5.(a) through (g). If this field contains a BCS Space (code 0x20), it shall imply that no NSIF File Classification Reason applies.	1	BCS-A A through G (Default is BCS Space (0x20))	<R>
RESRDT	RES Security Source Date. This field is not for general use but may be employed by some national systems. This field shall indicate the date of the source used to derive the classification of the NSIF File. In the case of multiple sources, the date of the most recent source shall be used. If this field is all BCS Spaces (code 0x20), it shall imply that a File Security Source Date does not apply.	8	CCYYMMDD (Default is BCS Spaces (0x20))	<R>

Table C-1-9. NSIF Reserved Extension Segment (RES) Subheader (continued)

FIELD	NAME	SIZE	VALUE RANGE	TYPE
RECTLN	RES Security Control Number. This field is not for general use but may be employed by some national systems. This field shall contain a valid Security Control Number associated with the NSIF File. The format of the Security Control Number shall be in accordance with the regulations governing the appropriate security channel(s). If this field is all BCS Spaces (code 0x20), it shall imply that no File Security Control Number applies.	15	BCS-A (Default is BCS Spaces (0x20))	<R>
RESSHL	RES Length of User-Defined Subheader Fields. This field shall contain the number of bytes in the RESSHF field. If this field contains BCS Zeros (code 0x30), the RESSHF field shall not appear in the RES Subheader.	4	BCS-N integer 0000 to 9999 (Default is BCS Zeros (0x30))	R
RESSHF	RES User-Defined Subheader Fields. This field shall contain user-defined fields. Data in this field shall be alphanumeric, formatted according to user specification.	†[9]	BCS-A User-defined	C
RESDATA	RES User-defined Data Field. This field shall contain data of either binary or character types defined by and formatted according to the user's specification. The length (size) of this field shall not cause any other NSIF Field length (size) limits to be exceeded, but is otherwise fully user-defined.	††[9]	User-defined	R

†[9] Value of the RESSHL field (in bytes)
††[9] Determined by the definition of the specific RES as registered and controlled with the Custodian.

APPENDIX 2 TO ANNEX C. EXAMPLE NSIF FILE

This appendix contains general or explanatory information that may be helpful but is not mandatory.

1. Use of NSIF. Though the NSIF was conceived initially to support the transmission of a file composed of a single base image, image insets (subimage overlays), graphic overlays, and text, its current form makes it suitable for a wide variety of file exchange needs. One of the flexible features of the NSIF is that it allows several Segments to be included in one NSIF File, yet any of the data types may be omitted. Thus, for example, the NSIF may equally well be used for the storage of a single portion of text, a single image or a complex composition of several images, graphics, and text. The following section discusses an example NSIF File of moderate complexity.

2. Example NSIF File. Table C-2-1 shows the contents of the fields in the Header of a sample NSIF File composed of two ISs, (one base image, one inset image), five graphic overlays, and five text selections. Figure C-2-1 shows a part of the sample NSIF File as a composite image with its overlay graphics. In a NSIF File, the data of each Segment is stored in a Data Field preceded by the Segment Subheader. The Subheader for a data type is omitted if no data of that type of Segment are included in the NSIF File. Segment Subheader Field contents in the sample NSIF File are shown in Table C-2-2 through Table C-2-9.

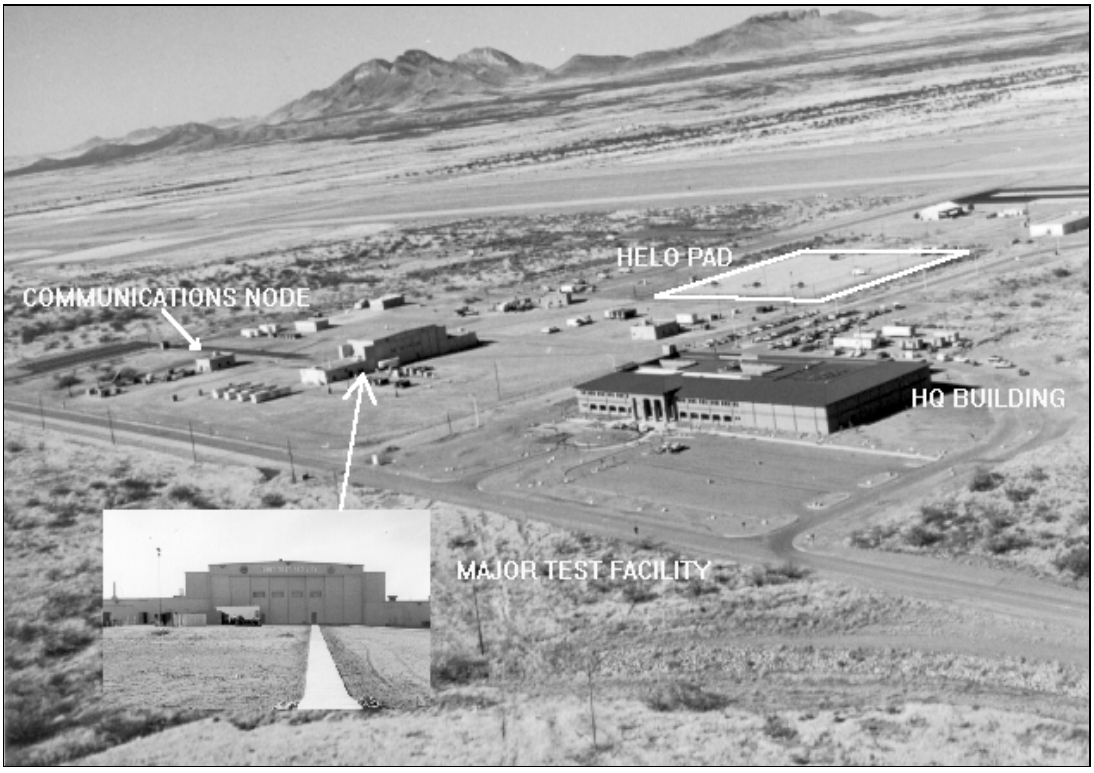


Figure C-2-1. Sample NSIF File Composite Image

Table C-2-1. Example NSIF File Header

NSIF HEADER FIELD	FORMAT	COMMENT
File Profile Name and Version (FHDR)	NSIF01.00	9 characters
Complexity Level (CLEVEL)	05	2 characters - images less than or equal to 8k x 8k
Standard Type (STYPE)	BF01	4 characters
Originating Station Identifier (OSTAID)	U21SOO90	8 characters followed by 2 BCS Spaces (code 0x20) - 10 characters
File Date and Time (FDT)	19960930224632	14 characters
File Title (FTITLE)	MAJOR TEST FACILITY	19 characters followed by 61 BCS Spaces (code 0x20) - 80 characters
File Security Classification (FSCLAS)	U	1 character
File Security Classification System (FSCLSY)	NS	2 characters
File Codewords (FSCODE)		11 BCS Spaces (code 0x20)
File Control and Handling (FSCTLH)		2 BCS Spaces (code 0x20)
File Releasing Instructions (FSREL)		20 BCS Spaces (code 0x20)
File Declassification Type (FSDCTP)		2 BCS Spaces (code 0x20)
File Declassification Date (FSDCDT)		8 BCS Spaces (code 0x20)
File Declassification Exemption (FSDCXM)		4 BCS Spaces (code 0x20)
File Downgrade (FSDG)		1 BCS Spaces (code 0x20)
File Downgrade Date (FSDGDT)		8 BCS Spaces (code 0x20)
File Classification Text (FSCLTX)		43 BCS Spaces (code 0x20)
File Classification Authority Type (FSCATP)		1 BCS Spaces (code 0x20)
File Classification Authority (FSCAUT)		40 BCS Spaces (code 0x20)
File Classification Reason (FSCRSN)		1 BCS Spaces (code 0x20)
File Security Source Date (FSSRDT)		8 BCS Spaces (code 0x20)
File Security Control Number (FSCTLN)		15 BCS Spaces (code 0x20)
File Copy Number (FSCOP)	00000	5 digits - all zeros indicate there is no tracking of NSIF File copies
File Number of Copies (FSCPYS)	00000	5 digits - all zeros indicate there is no tracking of NSIF File copies
Encryption (ENCRYP)	0	required default no encryption
File Background Colour (FBKGC)	0x000000	3 bytes (binary)
Originator's Name (ONAME)	W. Tempel	9 characters followed by 15 BCS Spaces (code 0x20) - 24 characters
Originator's Phone Number (OPHONE)	44 1480 84 5611	15 characters followed by 3 BCS Spaces (code 0x20) - 18 characters
File Length (FL)	000002925155	12 digits
NSIF File Header Length (HL)	000515	6 digits

Table C-2-1. Example NSIF File Header (continued)

NSIF HEADER FIELD	FORMAT	COMMENT
Number of Image Segments (NUMI)	002	3 digits
Length of 1st Image Subheader (LISH001)	000679	6 digits
Length of 1st Image Segment (LI001)	0002730600	10 digits
Length of 2nd Image Subheader (LISH002)	000439	6 digits
Length of 2nd Image Segment (LI002)	0000089600	10 digits
Number of Graphics Segments (NUMS)	005	3 digits
Length of 1st Graphic Subheader (LSSH001)	0258	4 digits
Length of 1st Graphic Segment (LS001)	000122	6 digits
Length of 2nd Graphic Subheader (LSSH002)	0258	4 digits
Length of 2nd Graphic Segment (LS002)	000122	6 digits
Length of 3rd Graphic Subheader (LSSH003)	0258	4 digits
Length of 3rd Graphic Segment (LS003)	000150	6 digits
Length of 4th Graphic Subheader (LSSH004)	0258	4 digits
Length of 4th Graphic Segment (LS004)	000112	6 digits
Length of 5th Graphic Subheader (LSSH005)	0258	4 digits
Length of 5th Graphic Segment (LS005)	000116	6 digits
Reserved for Future Use (NUMX)	000	3 digits
Number of Text Segments (NUMT)	005	3 digits
Length of 1st Text Subheader (LTSH001)	0282	4 digits
Length of 1st Text Segment (LT001)	20000	5 digits
Length of 2nd Text Subheader (LTSH002)	0282	4 digits
Length of 2nd Text Segment (LT002)	20000	5 digits
Length of 3rd Text Subheader (LTSH003)	0282	4 digits
Length of 3rd Text Segment (LT003)	20000	5 digits
Length of 4th Text Subheader (LTSH004)	0282	4 digits
Length of 4th Text Segment (LT004)	20000	5 digits
Length of 5th Text Subheader (LTSH005)	0282	4 digits
Length of 5th Text Segment (LT005)	20000	5 digits
Number of Data Extension Segments (NUMDES)	000	3 digits
Number of Reserved Extension Segments (NUMRES)	000	3 digits
User-Defined Header Data Length (UDHDL)	00000	5 digits
Extended Header Data Length (XHDL)	00000	5 digits

a. Explanation of the NSIF File Header. The NSIF File Type and Version, NSIF 01.00, is listed first. The next field contains the NSIF File's CLEVEL, in this case 05. A four character reserved field for the System Type (STYPE), defaulted to blanks, appears next. An identification code containing ten characters for the station originating the primary information in the NSIF File is given next. The NSIF File origination date and time follow this and are given in UTC (Zulu) time format. This is followed by the NSIF File Title (FTITLE) Field containing up to 80 characters of free form text. The title of the sample NSIF File contains less than 80 characters, and therefore, the remainder of the field is padded with blanks. The File Security Classification (FSCLAS) follows and contains one character. Several security-related optional fields and a conditional field follow. Encryption (ENCRYP) is given a 0 indicating that the NSIF File is not encrypted. The Originator's Name (ONAME) and the Originator's Phone Number (OPHONE) are given next. These fields may be left blank. Then the length in bytes (File Length (FL) Field) of the entire NSIF File is given, including all Headers, Subheaders, and data. This is followed by the length in bytes (NSIF File Header Length (HL)) of the NSIF File Header. The NUMI field contains the characters 002 to indicate two images are included in the NSIF File. This is followed by six characters to specify the LISHn, then ten characters for the LIn. The length of the second Image Subheader and the length of the second image follow. The next field in the NSIF File Header is the Number of Graphics (NUMS) Field, which contains 005 to indicate that five graphics are present in the NSIF File. The next ten characters contain the Length of Graphic Subheader (LSSHn) and Length of Graphic (LSn) (four and six characters respectively) for the first through fifth graphics, one after the other. The field, Number of Text Files (NUMT), is given as 005 and is followed by four characters specifying the Length of the Text Subheader (LTSHn) and five characters specifying the number of characters in the TS (Length of Text Segment (LTn) for each of the five TSs. The Number of Data Extension Segments (NUMDES) and the Number of Reserved Extension Segments (NUMRES) Fields are given as 000. This completes the road map for separating the data Subheaders from the actual data to follow. The next two fields in the Header are the User-Defined Header Data Length (UDHDL) and the UDHD. User-defined data could be used to include Registered TREs that provide additional information about the NSIF File. In this example, however, the length of the UDHDL is given as zero; therefore, the UDHD field is omitted. The last field in the Header is the Extended Header Data Length (XHDL). The length of the Extended Header is given as zero; therefore, the XHDL field is omitted, indicating that no Controlled TREs are included in the NSIF File Header.

b. Explanation of the Image Subheaders.

Table C-2-2. Example of the First Image Subheader
(† annotations are explained at the end of the table)

NSIF IMAGE SUBHEADER FIELD	FORMAT	COMMENT
File Part Type (IM)	IM	2 characters
Image ID1 (IID1)	0000000001	10 characters
Image Date and Time (IDATIM)	19960825203147	14 characters
Target Identifier (TGTID)		17 BCS Spaces (code 0x20)
Image Identifier 2 (IID2)	MAJOR TEST FACILITY AND HQ	26 characters followed by 54 BCS Spaces (code 0x20) - 80 characters
Image Security Classification (ISCLAS)	U	1 character
Image Security Classification System (ISCLSY)	NS	2 characters
Image Codewords (ISCODE)		11 BCS Spaces (code 0x20)
Image Control and Handling (ISCTLH)		2 BCS Spaces (code 0x20)
Image Releasing Instructions (ISREL)		20 BCS Spaces (code 0x20)
Image Declassification Type (ISDCTP)		2 BCS Spaces (code 0x20)
Image Declassification Date (ISDCDT)		8 BCS Spaces (code 0x20)
Image Declassification Exemption (ISDCXM)		4 BCS Spaces (code 0x20)
Image Downgrade (ISDG)		1 BCS Spaces (code 0x20)
Image Downgrade Date (ISDGDT)		8 BCS Spaces (code 0x20)
Image Classification Text (ISCLTX)		43 BCS Spaces (code 0x20)
Image Classification Authority Type (ISCATP)		1 BCS Spaces (code 0x20)
Image Classification Authority (ISCAUT)		40 BCS Spaces (code 0x20)
Image Classification Reason (ISCRSN)		1 BCS Spaces (code 0x20)
Image Security Source Date (ISSRDT)		8 BCS Spaces (code 0x20)
Image Security Control Number (ISCTLN)		15 BCS Spaces (code 0x20)
Encryption (ENCRYP)	0	required default
Image Source (ISORCE)	Hand-held digital camera model XYZ.	35 characters followed by 7 BCS Spaces (code 0x20) - 42 characters
Number of Significant Rows in Image (NROWS)	00001332	8 characters
Number of Significant Columns in Image (NCOLS)	00002050	8 characters
Pixel Value Type (PVTYPE)	INT	3 characters - interpret pixel values as integers

Table C-2-2. Example of the First Image Subheader (continued)

NSIF IMAGE SUBHEADER FIELD	FORMAT	COMMENT
Image Representation (IREP)	MONO	4 characters followed by 4 BCS Spaces (code 0x20) - grey scale imagery
Image Category (ICAT)	VIS	3 characters followed by 5 BCS Spaces (code 0x20) - visible imagery
Actual Bits-Per-Pixel per Band (ABPP)	08	2 digits
Pixel Justification (PJUST)	R	1 character
Image Coordinate System (ICORDS)		BCS Space (code 0x20) - indicates no geo location coordinates
Number of Image Comments (NICOM)	3	1 digit
†[2] Image Comment 1 (ICOM1)	This is a comment on Major Test Facility base and associated inset. This file w	80 characters
†[2] Image Comment 2 (ICOM2)	as developed at Fort Huachuca, Arizona. It shows the Joint Interoperability Tes	80 characters
†[2] Image Comment 3 (ICOM3)	t Command Building and associated range areas.	44 characters followed by 36 BCS Spaces (code 0x20) - 80 characters
Image Compression (IC)	NC	2 characters - indicates no compression
Number of Bands (NBANDS)	1	1 digit
1st Band Representation (IREPBAND1)		2 BCS Spaces (code 0x20)
1st Band Subcategory (ISUBCAT1)		6 BCS Spaces (code 0x20)
1st Band Image Filter Condition (IFC1)	N	1 character - required default value
1st Band Standard Image Filter Code (IMFLT1)		3 BCS Spaces (code 0x20) - reserved
Number of LUTs for the 1st Image Band (NLUTS1)	0	1 character
Image Sync Code (ISYNC)	0	1 digit
Image Mode (IMODE)	B	1 character - B required for 1 band
Number of Blocks Per Row (NBPR)	0001	4 digits
Number of Blocks Per Column (NBPC)	0001	4 digits

Table C-2-2. Example of the First Image Subheader (continued)

NSIF IMAGE SUBHEADER FIELD	FORMAT	COMMENT
Number of Pixels Per Block Horizontal (NPPBH)	2050	4 digits
Number of Pixels Per Block Vertical (NPPBV)	1332	4 digits
Number of Bits Per Pixel per Band(NBPP)	08	2 digits
Display Level (IDLVL)	001	3 characters - minimum value makes this base image
Attachment Level (IALVL)	000	required 3 digit value since minimum Display Level.
Image Location (ILOC)	0000000000	10 characters upper left pixel located at origin of Common Coordinate System
Image Magnification (IMAG)	1.0	3 character followed by a BCS Spaces (code 0x20) - 4 characters
User-Defined Image Data Length (UDIDL)	00000	5 digits
Image Extended Subheader Data Length (IXSHDL)	00000	5 digits

†[2] According to the standard - this should look like a single contiguous comment of up to three 80 character blocks.

(1) Explanation of the First Image Subheader. There are two images in this sample NSIF File. The first image has DLVL001. Its Subheader is shown in Table C-2-2. It is an unclassified, single band, single block, grey scale image with 8 bits per pixel and does not have an associated LUT. There are three associated comments. It is visible imagery, does not have geo-location data and is stored as an uncompressed image. It is located at the origin of the CCS within which all the displayable NSIF File components are located. It is 1332 rows by 2050 columns. Figure C-2-1 illustrates the image printed at approximately three hundred pixels per inch.

Table C-2-3. Example of the Second Image Subheader

NSIF IMAGE SUBHEADER FIELD	FORMAT	COMMENT
File Part Type (IM)	IM	2 characters
Image Identifier 1 (IID1)	Missing ID	10 characters
Image Date and Time (IDATIM)	19960927011729	14 characters
Target Identifier (TGTID)		17 BCS Spaces (code 0x20)
Image Identifier 2 (IID2)	Zoomed Test Facility	18 characters followed by 62 BCS Spaces (code 0x20) - 80 characters
Image Security Classification (ISCLAS)	U	1 character
Image Security Classification System (ISCLSY)	NS	2 characters
Image Codewords (ISCODE)		11 BCS Spaces (code 0x20)
Image Control and Handling (ISCTLH)		2 BCS Spaces (code 0x20)
Image Releasing Instructions (ISREL)		20 BCS Spaces (code 0x20)
Image Declassification Type (ISDCTP)		2 BCS Spaces (code 0x20)
Image Declassification Date (ISDCDT)		8 BCS Spaces (code 0x20)
Image Declassification Exemption (ISDCXM)		4 BCS Spaces (code 0x20)
Image Downgrade (ISDG)		1 BCS Spaces (code 0x20)
Image Downgrade Date (ISDGDT)		8 BCS Spaces (code 0x20)
Image Classification Text (ISCLTX)		43 BCS Spaces (code 0x20)
Image Classification Authority Type (ISCATP)		1 BCS Spaces (code 0x20)
Image Classification Authority (ISCAUT)		40 BCS Spaces (code 0x20)
Image Classification Reason (ISCRSN)		1 BCS Spaces (code 0x20)
Image Security Source Date (ISSRDT)		8 BCS Spaces (code 0x20)
Image Security Control Number (ISCTLN)		15 BCS Spaces (code 0x20)
Encryption (ENCRYP)	0	required default
Image Source (ISORCE)	Cut of original image.	22 characters followed by 20 BCS Spaces (code 0x20) - 42 characters
Number of Significant Rows in Image (NROWS)	00000224	8 characters
Number of Significant Columns in Image (NCOLS)	00000400	8 characters
Pixel Value Type (PVTYPE)	INT	3 characters - interpret pixel values as integers
Image Representation (IREP)	MONO	4 characters followed by 4 BCS Spaces (code 0x20) - grey scale imagery
Image Category (ICAT)	VIS	3 characters followed by 5 BCS Spaces (code 0x20) - visible imagery

Table C-2-3. Example of the Second Image Subheader (continued)

NSIF IMAGE SUBHEADER FIELD	FORMAT	COMMENT
Actual Bits-Per-Pixel per Band (ABPP)	08	2 digits
Pixel Justification (PJUST)	R	1 character
Image Coordinate System (ICORDS)		BCS Space (0x20) indicates no geo location coordinates
Number of Image Comments (NICOM)	0	1 digit
Image Compression (IC)	NC	2 characters - indicates uncompressed
Number of Bands (NBANDS)	1	1 digit
1st Band Representation (IREPBAND1)		2 BCS Spaces (code 0x20)
1st Band Subcategory (ISUBCAT1)		6 BCS Spaces (code 0x20)
1st Band Image Filter Condition (IFC1)	N	1 character - required default value
1st Band Standard Image Filter Code (IMFLT1)		3 reserved BCS Spaces (code 0x20)
Number of LUTs for the 1st Image Band (NLUTS1)	0	1 character
Image Sync Code (ISYNC)	0	1 digit
Image Mode (IMODE)	B	1 character - B required for 1 band
Number of Blocks Per Row (NBPR)	0001	4 digits
Number of Blocks Per Column (NBPC)	0001	4 digits
Number of pixels Per Block Horizontal (NPPBH)	0400	4 digits
Number of Pixels Per Block Vertical (NPPBV)	0224	4 digits
Number Bits Per Pixel per Band(NBPP)	08	2 digits
Display Level (IDLVL)	002	3 digits
Attachment Level (IALVL)	001	3 digits
Image Location (ILOC)	0057800142	10 characters, located at row 578 column 142 of base image
Image Magnification (IMAG)	1.0	3 characters followed by a BCS Spaces (code 0x20) - 4 characters
User-Defined Image Data Length (UDIDL)	00000	5 digits
Image Extended Subheader Data Length (IXSHDL)	00000	5 digits

(2) Explanation of the Second Image Subheader. This image is the second image in the NSIF File. As is the first image, this image is an 8 bit visible, grey scale image. It is much smaller (400 columns x 224 rows) and is not compressed. Also, unlike the first image, it has no associated comment fields, indicated by the fact that the value of the Number of Image Comments (NICOM) Field is equal to zero. Since it is attached to the base image (IALVL contains 001), the ILOC field reveals that this image is located with its upper left corner positioned at Row 578, Column 142 with respect to the upper left corner of the base image. Since it has a DLVL greater than that of the base image, it will obscure part of the base image when they are both displayed.

c. Explanation of the Graphic Subheaders.

Table C-2-4. Graphic Subheader for the First Graphic

NSIF GRAPHIC SUBHEADER FIELD	FORMAT	COMMENT
File Part Type (SY)	SY	2
Graphic Identifier (SID)	0000000001	10
Graphic Name (SNAME)	HELO PAD RECTANGLE	18 characters followed by 2 BCS Spaces (code 0x20) - 20 characters
Graphic Security Classification (SSCLAS)	U	1 character
Graphic Security Classification System (SSCLSY)	NS	2 characters
Graphic Codewords (SSCODE)		11 BCS Spaces (code 0x20)
Graphic Control and Handling (SSCTLH)		2 BCS Spaces (code 0x20)
Graphic Releasing Instructions (SSREL)		20 BCS Spaces (code 0x20)
Graphic Declassification Type (SSDCTP)		2 BCS Spaces (code 0x20)
Graphic Declassification Date (SSDCDT)		8 BCS Spaces (code 0x20)
Graphic Declassification Exemption (SSDCXM)		4 BCS Spaces (code 0x20)
Graphic Downgrade (SSDG)		1 BCS Spaces (code 0x20)
Graphic Downgrade Date (SSDGDT)		8 BCS Spaces (code 0x20)
Graphic Classification Text (SSCLTX)		43 BCS Spaces (code 0x20)
Graphic Classification Authority Type (SSCATP)		1 BCS Spaces (code 0x20)
Graphic Classification Authority (SSCAUT)		40 BCS Spaces (code 0x20)
Graphic Classification Reason (SSCRSN)		1 BCS Spaces (code 0x20)
Graphic Security Source Date (SSSRDT)		8 BCS Spaces (code 0x20)
Graphic Security Control Number (SSCTLN)		15 BCS Spaces (code 0x20)
Encryption (ENCRYP)	0	required default
Graphic Type (SFMT)	C	1 character - indicates CGM
Reserved for Future Use (SSTRUCT)	0000000000000	13 BCS Zeros (code 0x30)
Display Level (SDLVL)	003	3 digits
Attachment Level (SALVL)	001	3 digits
Graphic Location (SLOC)	0039201110	10 characters
First Graphic Bound Location (SBND1)	0039201110	10 characters
Graphic Colour (SCOLOR)	M	indicates CGM File contains no colour components
Second Graphic Bound Location (SBND2)	0051001836	10 characters
Reserved for Future Use (SRES2)	00	2 BCS Zeros (code 0x30)

Table C-2-4. Graphic Subheader for the First Graphic (continued)

NSIF GRAPHIC SUBHEADER FIELD	FORMAT	COMMENT
Graphic Extended Subheader Data Length (SXSHDL)	00000	5 digits

(1) Explanation of the First Graphic Subheader. This graphic is a CGM graphic (HELO PAD RECTANGLE). The graphic is attached to the base image, and its location is recorded in the SLOC field (row 392, column 1110) and is measured as an offset from the origin at the upper left corner of that image.

Table C-2-5. Graphic Subheader for the Second Graphic

NSIF GRAPHIC SUBHEADER FIELD	FORMAT	COMMENT
File Part Type (SY)	SY	2
Graphic Identifier (SID)	0000000002	10
Graphic Name (SNAME)	ARROW	5 characters followed by 15 BCS Spaces (code 0x20) - 20 characters
Graphic Security Classification (SSCLAS)	U	1 character
Graphic Security Classification System (SSCLSY)	NS	2 characters
Graphic Codewords (SSCODE)		11 BCS Spaces (code 0x20)
Graphic Control and Handling (SSCTLH)		2 BCS Spaces (code 0x20)
Graphic Releasing Instructions (SSREL)		20 BCS Spaces (code 0x20)
Graphic Declassification Type (SSDCTP)		2 BCS Spaces (code 0x20)
Graphic Declassification Date (SSDCDT)		8 BCS Spaces (code 0x20)
Graphic Declassification Exemption (SSDCXM)		4 BCS Spaces (code 0x20)
Graphic Downgrade (SSDG)		1 BCS Spaces (code 0x20)
Graphic Downgrade Date (SSDGDT)		8 BCS Spaces (code 0x20)
Graphic Classification Text (SSCLTX)		43 BCS Spaces (code 0x20)
Graphic Classification Authority Type (SSCATP)		1 BCS Spaces (code 0x20)
Graphic Classification Authority (SSCAUT)		40 BCS Spaces (code 0x20)
Graphic Classification Reason (SSCRSN)		1 BCS Spaces (code 0x20)
Graphic Security Source Date (SSSRDT)		8 BCS Spaces (code 0x20)
Graphic Security Control Number (SSCTLN)		15 BCS Spaces (code 0x20)
Encryption (ENCRYP)	0	required default
Graphic Type (SFMT)	C	1 character - indicates CGM
Reserved for Future Use (SSTRUCT)	0000000000000	13 BCS Zeros (code 0x30)
Display Level (SDLVL)	004	3 digits
Attachment Level (SALVL)	002	3 digits
Graphic Location (SLOC)	0000000285	10 characters relative to origin of second image
First Graphic Bound Location (SBND1)	-022500270	10 characters relative to origin of second image
Graphic Colour (SCOLOR)	M	indicates CGM File contains no colour components
Second Graphic Bound Location (SBND2)	0000000300	10 characters relative to origin of second image

Table C-2-5. Graphic Subheader for the Second Graphic (continued)

NSIF GRAPHIC SUBHEADER FIELD	FORMAT	COMMENT
Reserved for Future Use (SRES2)	00	2 BCS Zeros (code 0x30)
Graphic Extended Subheader Data Length (SXSHDL)	00000	5 digits

(2) Explanation of the Second Graphic Subheader. The second graphic is also a CGM graphic. It is the arrow pointing to the test facility. It is attached to the subimage. Therefore, its location as recorded in the SLOC field is measured as an offset from the upper left corner of the subimage.

Table C-2-6. Graphic Subheader for the Third Graphic

NSIF GRAPHIC SUBHEADER FIELD	FORMAT	COMMENT
File Part Type (SY)	SY	2
Graphic Identifier (SID)	0000000003	10
Graphic Name (SNAME)	HQ BUILDING	11 characters followed by 9 BCS Spaces (code 0x20) - 20 characters
Graphic Security Classification (SSCLAS)	U	1 character
Graphic Security Classification System (SSCLSY)	NS	2 characters
Graphic Codewords (SSCODE)		11 BCS Spaces (code 0x20)
Graphic Control and Handling (SSCTLH)		2 BCS Spaces (code 0x20)
Graphic Releasing Instructions (SSREL)		20 BCS Spaces (code 0x20)
Graphic Declassification Type (SSDCTP)		2 BCS Spaces (code 0x20)
Graphic Declassification Date (SSDCDT)		8 BCS Spaces (code 0x20)
Graphic Declassification Exemption (SSDCXM)		4 BCS Spaces (code 0x20)
Graphic Downgrade (SSDG)		1 BCS Spaces (code 0x20)
Graphic Downgrade Date (SSDGDT)		8 BCS Spaces (code 0x20)
Graphic Classification Text (SSCLTX)		43 BCS Spaces (code 0x20)
Graphic Classification Authority Type (SSCATP)		1 BCS Spaces (code 0x20)
Graphic Classification Authority (SSCAUT)		40 BCS Spaces (code 0x20)
Graphic Classification Reason (SSCRSN)		1 BCS Spaces (code 0x20)
Graphic Security Source Date (SSSRDT)		8 BCS Spaces (code 0x20)
Graphic Security Control Number (SSCTLN)		15 BCS Spaces (code 0x20)
Encryption (ENCRYP)	0	required default
Reserved for Future Use (SSTRUCT)	0000000000000	13 BCS Zeros (code 0x30)
Display Level (SDLVL)	005	3 digits
Attachment Level (SALVL)	001	3 digits
Graphic Location (SLOC)	0000000000	10 characters
First Graphic Bound Location (SBND1)	0062501710	10 characters
Graphic Colour (SCOLOR)	M	indicates CGM File contains no colour components
Second Graphic Bound Location (SBND2)	0070502010	10 characters
Reserved for Future Use (SRES2)	00	2 BCS Zeros (code 0x30)
Graphic Extended Subheader Data Length (SXSHDL)	00000	5 digits

(3) Explanation of the Third Graphic Subheader. The third graphic is a CGM annotation (HQ Building). It is attached to the base image. Its location as recorded in the SLOC field is measured as an offset from the upper left corner of the base image, in this case the value of the SLOC field is (0,0) and the offsetting for this graphic is actually done within the CGM construct itself.

Table C-2-7. Graphic Subheader for the Fourth Graphic

NSIF GRAPHIC SUBHEADER FIELD	FORMAT	COMMENT
File Part Type (SY)	SY	2
Graphic Identifier (SID)	0000000004	10
Graphic Name (SNAME)	MAJOR TEST FACILITY	19 characters followed by 1 BCS Space (code 0x20) - 20 characters
Graphic Security Classification (SSCLAS)	U	1 character
Graphic Security Classification System (SSCLSY)	NS	2 characters
Graphic Codewords (SSCODE)		11 BCS Spaces (code 0x20)
Graphic Control and Handling (SSCTLH)		2 BCS Spaces (code 0x20)
Graphic Releasing Instructions (SSREL)		20 BCS Spaces (code 0x20)
Graphic Declassification Type (SSDCTP)		2 BCS Spaces (code 0x20)
Graphic Declassification Date (SSDCDT)		8 BCS Spaces (code 0x20)
Graphic Declassification Exemption (SSDCXM)		4 BCS Spaces (code 0x20)
Graphic Downgrade (SSDG)		1 BCS Spaces (code 0x20)
Graphic Downgrade Date (SSDGDT)		8 BCS Spaces (code 0x20)
Graphic Classification Text (SSCLTX)		43 BCS Spaces (code 0x20)
Graphic Classification Authority Type (SSCATP)		1 BCS Spaces (code 0x20)
Graphic Classification Authority (SSCAUT)		40 BCS Spaces (code 0x20)
Graphic Classification Reason (SSCRSN)		1 BCS Spaces (code 0x20)
Graphic Security Source Date (SSSRDT)		8 BCS Spaces (code 0x20)
Graphic Security Control Number (SSCTLN)		15 BCS Spaces (code 0x20)
Encryption (ENCRYP)	0	Required default
Graphic Type (SFMT)	C	1 character - indicates CGM
Reserved for Future Use (SSTRUCT)	0000000000000	13 BCS Zeros (code 0x30)
Display Level (SDLVL)	006	3 digits
Attachment Level (SALVL)	002	3 digits
Graphic Location (SLOC)	0008500415	10 characters relative to origin of second image
First Graphic Bound Location (SBND1)	0008500415	10 characters relative to origin of second image
Graphic Colour (SCOLOR)	M	Indicates CGM File contains no colour components
Second Graphic Bound Location (SBND2)	0011500755	10 characters relative to origin of second image

Table C-2-7. Graphic Subheader for the Fourth Graphic (continued)

NSIF GRAPHIC SUBHEADER FIELD	FORMAT	COMMENT
Reserved for Future Use (SRES2)	00	2 BCS Zeros (code 0x30)
Graphic Extended Subheader Data Length (SXSHDL)	00000	5 digits

(4) Explanation of the Fourth Graphic Subheader. The fourth graphic is a CGM graphic. It is the MAJOR TEST FACILITY text. It is attached to the subimage. Therefore, its location as recorded in the SLOC field is measured as an offset from the upper left corner of the subimage.

Table C-2-8. Graphic Subheader for the Fifth Graphic

NSIF GRAPHIC SUBHEADER FIELD	FORMAT	COMMENT
File Part Type (SY)	SY	2
Graphic Identifier (SID)	0000000005	10
Graphic Name (SNAME)	COMMUNICATIO N ARROW	19 characters followed by 1 BCS Space (code 0x20) - 20 characters
Graphic Security Classification (SSCLAS)	U	1 character
Graphic Security Classification System (SSCLSY)	NS	2 characters
Graphic Codewords (SSCODE)		11 BCS Spaces (code 0x20)
Graphic Control and Handling (SSCTLH)		2 BCS Spaces (code 0x20)
Graphic Releasing Instructions (SSREL)		20 BCS Spaces (code 0x20)
Graphic Declassification Type (SSDCTP)		2 BCS Spaces (code 0x20)
Graphic Declassification Date (SSDCDT)		8 BCS Spaces (code 0x20)
Graphic Declassification Exemption (SSDCXM)		4 BCS Spaces (code 0x20)
Graphic Downgrade (SSDG)		1 BCS Spaces (code 0x20)
Graphic Downgrade Date (SSDGDT)		8 BCS Spaces (code 0x20)
Graphic Classification Text (SSCLTX)		43 BCS Spaces (code 0x20)
Graphic Classification Authority Type (SSCATP)		1 BCS Spaces (code 0x20)
Graphic Classification Authority (SSCAUT)		40 BCS Spaces (code 0x20)
Graphic Classification Reason (SSCRSN)		1 BCS Spaces (code 0x20)
Graphic Security Source Date (SSSRDT)		8 BCS Spaces (code 0x20)
Graphic Security Control Number (SSCTLN)		15 BCS Spaces (code 0x20)
Encryption (ENCRYP)	0	Required default
Graphic Type (SFMT)	C	1 character - indicates CGM
Reserved for Future Use (SSTRUCT)	0000000000000	13 BCS Zeros (code 0x30)
Display Level (SDLVL)	007	3 digits
Attachment Level (SALVL)	001	3 digits
Graphic Location (SLOC)	0047000040	10 characters
First Graphic Bound Location (SBND1)	0047000040	10 characters
Graphic Colour (SCOLOR)	M	Indicates CGM File contains no colour components
Second Graphic Bound Location (SBND2)	0059000600	10 characters
Reserved for Future Use (SRES2)	00	2 BCS Zeros (code 0x30)
Graphic Extended Subheader Data Length (SXSHDL)	00000	5 digits

(5) Explanation of the Fifth Graphic Subheader. The fifth graphic is a CGM graphic. It is the COMMUNICATIONS NODE annotation with associated arrow. It is attached to the base image. Therefore, its location as recorded in the SLOC field is measured as an offset from the upper left corner of the base image.

d. Explanation of the Text Subheaders. There are 5 TSs included in the NSIF File. Other than the text data they differ only in matters such as title, date-time of creation, and ID. Therefore, only the first is discussed, since the Subheaders of all the rest are essentially the same.

Table C-2-9. Text Subheader for the Text Segment (TS)

NSIF TEXT SUBHEADER FIELD	FORMAT	COMMENT
File Part Type (TE)	TE	2 characters
Text Identifier (TEXTID)	0000000001	10 characters
Text Date and Time (TXTDT)	19960930224530	14 characters
Text Title (TXTITL)	Title of the first TS.	22 characters followed by 58 BCS Spaces (code 0x20) - 80 characters
Text Security Classification (TSCLAS)	U	1 character
Text Security Classification System (TSCLSY)	NS	2 characters
Text Codewords (TSCODE)		11 BCS Spaces (code 0x20)
Text Control and Handling (TSCTLH)		2 BCS Spaces (code 0x20)
Text Releasing Instructions (TSREL)		20 BCS Spaces (code 0x20)
Text Declassification Type (TSDCTP)		2 BCS Spaces (code 0x20)
Text Declassification Date (TSDCDT)		8 BCS Spaces (code 0x20)
Text Declassification Exemption (TSDCXM)		4 BCS Spaces (code 0x20)
Text Downgrade (TSDG)		1 BCS Spaces (code 0x20)
Text Downgrade Date (TSDGDT)		8 BCS Spaces (code 0x20)
Text Classification Text (TSCLTX)		43 BCS Spaces (code 0x20)
Text Classification Authority Type (TSCATP)		1 BCS Spaces (code 0x20)
Text Classification Authority (TSCAUT)		40 BCS Spaces (code 0x20)
Text Classification Reason (TSCRSN)		1 BCS Spaces (code 0x20)
Text Security Source Date (TSSRDT)		8 BCS Spaces (code 0x20)
Text Security Control Number (TSCTLN)		15 BCS Spaces (code 0x20)
Encryption (ENCRYP)	0	1 character - required default
Text Format (TXTFMT)	STA	3 characters
Text Extended Subheader Data Length (TXSHDL)	00000	5 digits

(1) Explanation of the First Text Subheader. The first TS is unclassified and was created on September 30, 1996 at 22:45 hours. Its Subheader is shown in Table C-2-9.

APPENDIX 3 TO ANNEX C. IMPLEMENTATION CONSIDERATIONS

GENERAL

This appendix contains general or explanatory information that may be helpful but is not mandatory.

1. NSIF Implementation Guidelines. The NSIF has been developed to provide image exchange capabilities among computer systems of various designs and capabilities. This appendix will discuss general considerations pertinent to successful NSIF implementation. Guidelines will be presented, and potential problems will be highlighted. The NSIF pre-processor and post-processor software, the software necessary to write and read a NSIF File based on host files containing the Segments to be included, are to be written by the user. The combination of the pre-processor and post-processor hereafter will be referred to as the NSIF implementation. Pre-processing is sometimes called packing, and post-processing is called unpacking. NSIF implementation sample software is available through your point of contact.

GENERAL REQUIREMENTS

2. Scope of NSIF Implementation. NSIF describes the format of images and graphics and text within the NSIF File only. It does not define the image or text requirements of the host system. The host system is responsible for the handling of unpacked image and text, as well as image and text display capabilities.

3. Creating NSIF Headers and NSIF Subheaders. This standard specifies legal values for the Header and Subheader Fields. The NSIF pre-processor for any particular host system will be responsible for enforcing the field values as stated in this standard.

4. Character Counts. The NSIF uses explicit byte counts to delimit fields. No end-of-field characters are used. These byte counts are critical for the proper interpretation of a NSIF File. The NSIF pre-processor should compute these byte counts based on the NSIF File contents to insure accuracy. All fields in the NSIF File Header and Subheaders must be present exactly as specified in the NSIF File Header and Subheader descriptions, and no additional fields may be inserted. The NSIF uses various conditional fields whose presence is determined by previous fields and counts. If an expected conditional field is missing, the remainder of the NSIF File will be misinterpreted. A similar result will occur if a conditional field is inserted when it is not required. For these reasons, the counts are critical, and every effort must be made to ensure their accuracy. The NSIF pre-processor should compute these counts based on the NSIF File contents whenever possible.

5. Data Entry. To reduce any operator workload imposed by the pre-processor, each pre-processor should provide for the automatic entry of data. Global default values for the particular NSIF Version should be inserted automatically in the NSIF File. System default values, such as the standard size parameters for a base image, also should be entered automatically by the pre-processor. Values that are known to the system, such as the time or the computed size of an overlay, also should be entered automatically.

6. User-Defined NISF File Header and User-Defined Image Subheader Data Fields. Users may need to add additional data to a NSIF File Header or Image Subheader. To accommodate this requirement, user-defined Data Fields are provided in the NSIF File Header and Image Subheader. One potential use for the user-defined Image Subheader Data field is to provide space for directly associating acquisition parameters with the image. Use of the user-defined Header and user-defined Image Subheader Data Fields requires insertion of Tagged Records that implement the extension as described in this standard. Before use, Tags shall be registered with the Custodian according to procedures available from the Custodian. This procedure ensures that different users will not use the same Tag to flag different extended data. It also provides for configuration management of Tagged Record formats where the extended data are expected to be used by a wide audience of users.

a. Handling the Extended Headers and Subheaders. The NSIF has made allowances for future enhancements by defining Extended Headers and Subheaders, the contents of which are under configuration control. These fields should not be used except as provided for in documentation available from the Custodian. These Extended Headers are composed of an Extended Header byte count and Extended Header data. The Extended Header count must be extracted by the software, and the appropriate number of Extended Header bytes must be read or bypassed. Five Extended Headers are in the current NSIF format under configuration control. They are the XHD in the NSIF Header, the IXSHD in the Image Subheader, the SXSHD in the Graphic Subheader, and the TXSHD in the Text Subheader. The NSIF also has made allowances for Extended

Headers that are under user control by providing the UDHD field in the NSIF Header and the UDID field in the Image Subheader. Use of these fields must be co-ordinated with the Custodian by Tag registration, but it is not under configuration management. Implementors are reminded that these Extended Headers also must be handled properly (skip over them if there are no means to interpret them properly).

7. Out-of-Bounds Field Values. The NSIF File creator is responsible for ensuring that all NSIF field values are within the bounds specified by the NSIF document. An out-of-bounds value in a NSIF field indicates that either an error occurred or that the sending station was not in full compliance with NSIF.

8. Use of Images in NSIF. The NSIF specifies a format for images contained within a NSIF File only. A NSIF implementation must be capable of translating this format to and from the host systems local format. Some host systems have multiple formats for binary data. In these cases, the NSIF implementation must use the appropriate host format to provide the necessary data exchange services with other system packages. When imagery data of N bits-per-pixel is displayed on an M-bit (2^M grey shades) display device (N < M), it must be transformed into the dynamic range of the device. One way to do this is to modify the LUTs of the display device. However, if M-bit and N-bit imagery is displayed simultaneously, the M-bit image will appear distorted. The recommended method is to convert the N-bit imagery into M-bit imagery, then use the standard LUTs. The following equation will transform a N-bit pixel into an M-bit pixel:

M = number of bits-per-pixel of display device
N = number of bits-per-pixel of image (Table C-1-3, field ABPP) where N < M
P_N = N-bit pixel value
P_M = M-bit pixel value

$$P_M = \frac{2^M - 1}{2^N - 1} P_N$$

9. Use of Text in NSIF. The TXTFMT field (Table C-1-6) is provided to help the reader of the NSIF File determine how to interpret the text data received. The NSIF File reader is responsible for interpreting the various text formats. Format designations explicitly supported by the NSIF are as follows:

a. NSIF Basic Character Set (BCS). NSIF BCS is a special format to provide a common format for all NSIF implementations. The BCS code shall be represented as depicted in Table C-3-1 and Table C-3-2. This is the BCS code represented in ISO/IEC 10646-1. The BCS codes shall be seven bits, a_1 through a_7 with an eighth bit added. The eighth bit, a_8, shall be set to 0. The a_8 bit shall be the MSB, and a_1 shall be the LSB. It is intended to provide for simple communications among NSIF stations. The NSIF BCS format is comprised of the following BCS characters (all numbers are decimal): Line Feed (10), Form Feed (12), Carriage Return (13), and Space (32) through Tilde (126). This set includes all the alphanumeric characters as well as all commonly used punctuation characters. All lines within a NSIF BCS TS will be separated by carriage return/line feed pairs. It is the responsibility of the local system to translate these pairs into the local format. NSIF BCS has no standard line length. The host system must be capable of processing lines that are longer than the local standard. For NSIF Headers and Subheaders, BCS codes are further restrained:

(1) BCS-N (Numeric format). The range of allowable characters for BCS-N consists of the numbers ‘0’ through ‘9’ from the BMP block named ‘BASIC LATIN’, codes 0x30 through 0x39 and the following:

Slant bar	code 0x2F
Plus	code 0x2B
Minus	code 0x2D
Decimal point	code 0x2E

(2) BCS-A (Alphanumeric format). The range of allowable characters for BCS-A consists of Space through Tilde (BCS codes 0x20 through 0x7E).

Table C-3-1. Basic Latin Character Set

(Shaded areas are not used for NSIF BCS. Unshaded areas are NSIF BCS.)

(Column headings are the MSB and row headings are the LSB.)

	0	1	2	3	4	5	6	7
0	000	016	SP 032	0 048	@ 064	P 080	` 096	p 112
1	001	017	! 033	1 049	A 065	Q 081	a 097	q 113
2	002	018	“ 034	2 050	B 066	R 082	b 098	r 114
3	003	019	# 035	3 051	C 067	S 083	c 099	s 115
4	004	020	$ 036	4 052	D 068	T 084	d 100	t 116
5	005	021	% 037	5 053	E 069	U 085	e 101	u 117
6	006	022	& 038	6 054	F 070	V 086	f 102	v 118
7	007	023	‘ 039	7 055	G 071	W 087	g 103	w 119
8	008	024	(040	8 056	H 072	X 088	h 104	x 120
9	009	025	) 041	9 057	I 073	Y 089	i 105	y 121
A	010	026	* 042	: 058	J 074	Z 090	j 106	z 122
B	011	027	+ 043	; 059	K 075	[091	k 107	{ 123
C	012	028	‘ 044	< 060	L 076	\ 092	1 108	• 124
D	013	029	- 045	= 061	M 077	] 093	m 109	} 125
E	014	030	. 046	> 062	N 078	^ 094	n 110	~ 126
F	015	031	/ 047	? 063	O 079	_ 095	o 111	127

Table C-3-2. Latin Supplement Character Set

(Shaded areas are non-ASCII. Unshaded areas are additional characters used in UT1.)

	8	9	A	B	C	D	E	F
0	128	144	NB SP 160	° 176	À 192	Đ 208	à 224	ð 240
1	129	145	¡ 161	± 177	Á 193	Ñ 209	á 225	ñ 241
2	130	146	¢ 162	² 178	Â 194	Ò 210	â 226	ò 242
3	131	147	£ 163	³ 179	Ã 195	Ó 211	ã 227	ó 243
4	132	148	¤ 164	´ 180	Ä 196	Ô 212	ä 228	ô 244
5	133	149	¥ 165	µ 181	Å 197	Õ 213	å 229	õ 245
6	134	150	¦ 166	¶ 182	Æ 198	Ö 214	æ 230	ö 246
7	135	151	§ 167	· 183	Ç 199	× 215	ç 231	÷ 247
8	136	152	¨ 168	¸ 184	È 200	Ø 216	è 232	ø 248
9	137	153	© 169	¹ 185	É 201	Ù 217	é 233	ù 249
A	138	154	ª 170	º 186	Ê 202	Ú 218	ê 234	ú 250
B	139	155	« 171	» 187	Ë 203	Û 219	ë 235	û 251
C	140	156	¬ 172	¼ 188	Ì 204	Ü 220	ì 236	ü 252
D	141	157	- 173	½ 189	Í 205	Ý 221	í 237	ý 253
E	142	158	® 174	¾ 190	Î 206	Þ 222	î 238	þ 254
F	143	159	¯ 175	¿ 191	Ï 207	ß_ 223	ï 239	ÿ 255

Table C-3-3. Basic Latin Character Set Explanation

Decimal	Hex	Name
032	20	SPACE
033	21	EXCLAMATION MARK
034	22	QUOTATION MARK
035	23	NUMBER SIGN
036	24	DOLLAR SIGN
037	25	PERCENT SIGN
038	26	AMPERSAND
039	27	APOSTROPHE
040	28	LEFT PARENTHESIS
041	29	RIGHT PARENTHESIS
042	2A	ASTERISK
043	2B	PLUS SIGN
044	2C	COMMA
045	2D	HYPHEN-MINUS
046	2E	FULL STOP
047	2F	SOLIQUS
048	30	DIGIT ZERO
049	31	DIGIT ONE
050	32	DIGIT TWO
051	33	DIGIT THREE
052	34	DIGIT FOUR
053	35	DIGIT FIVE
054	36	DIGIT SIX
055	37	DIGIT SEVEN
056	38	DIGIT EIGHT
057	39	DIGIT NINE
058	3A	COLON
059	3B	SEMICOLON
060	3C	LESS-THAN SIGN
061	3D	EQUALS SIGN
062	3E	GREATER-THAN SIGN
063	3F	QUESTION MARK
064	40	COMMERCIAL AT
065	41	LATIN CAPITAL LETTER A
066	42	LATIN CAPITAL B
067	43	LATIN CAPITAL C
068	44	LATIN CAPITAL D
069	45	LATIN CAPITAL E
070	46	LATIN CAPITAL F
071	47	LATIN CAPITAL G
072	48	LATIN CAPITAL H
073	49	LATIN CAPITAL I
074	4A	LATIN CAPITAL J
075	4B	LATIN CAPITAL K
076	4C	LATIN CAPITAL L
077	4D	LATIN CAPITAL M
078	4E	LATIN CAPITAL N
079	4F	LATIN CAPITAL O
080	50	LATIN CAPITAL P
081	51	LATIN CAPITAL Q
082	52	LATIN CAPITAL R
083	53	LATIN CAPITAL S
084	54	LATIN CAPITAL T
085	55	LATIN CAPITAL U
086	56	LATIN CAPITAL V
087	57	LATIN CAPITAL W

Table C-3-3. Basic Latin Character Set Explanation (continued)

Decimal	Hex	Name
088	58	LATIN CAPITAL X
089	59	LATIN CAPITAL Y
090	5A	LATIN CAPITAL Z
091	5B	LEFT SQUARE BRACKET
092	5C	REVERSE SOLIDUS
093	5D	RIGHT SQUARE BRACKET
094	5E	CIRCUMFLEX ACCENT
095	5F	LOW LINE
096	60	GRAVE ACCENT
097	61	LATIN SMALL LETTER A
098	62	LATIN SMALL LETTER B
099	63	LATIN SMALL LETTER C
100	64	LATIN SMALL LETTER D
101	65	LATIN SMALL LETTER E
102	66	LATIN SMALL LETTER F
103	67	LATIN SMALL LETTER G
104	68	LATIN SMALL LETTER H
105	69	LATIN SMALL LETTER I
106	6A	LATIN SMALL LETTER J
107	6B	LATIN SMALL LETTER K
108	6C	LATIN SMALL LETTER L
109	6D	LATIN SMALL LETTER M
110	6E	LATIN SMALL LETTER N
111	6F	LATIN SMALL LETTER O
112	70	LATIN SMALL LETTER P
113	71	LATIN SMALL LETTER Q
114	72	LATIN SMALL LETTER R
115	73	LATIN SMALL LETTER S
116	74	LATIN SMALL LETTER T
117	75	LATIN SMALL LETTER U
118	76	LATIN SMALL LETTER V
119	77	LATIN SMALL LETTER W
120	78	LATIN SMALL LETTER X
121	79	LATIN SMALL LETTER Y
122	7A	LATIN SMALL LETTER Z
123	7B	LEFT CURLY BRACKET
124	7C	VERTICAL LINE
125	7D	RIGHT CURLY BRACKET
126	7E	TILDE

Table C-3-4. Latin Supplement Character Set Explanation

Decimal	Hex	Name
160	A0	NO BREAK SPACE
161	A1	INVERTED EXCLAMATION MARK
162	A2	CENT SIGN
163	A3	POUND SIGN
164	A4	CURRENCY SIGN
165	A5	YEN SIGN
166	A6	BROKEN BAR
167	A7	SECTION SIGN
168	A8	DIAERESIS
169	A9	COPYRIGHT
170	AA	FEMININE ORDINAL INDICATOR
171	AB	LEFT-POINTING DOUBLE ANGLE QUOTATION MARK
172	AC	NOT SIGN
173	AD	SOFT HYPHEN
174	AE	REGISTERED SIGN
175	AF	MACRON
176	B0	DEGREE SIGN
177	B1	PLUS-MINUS SIGN
178	B2	SUPERSCRIPT TWO
179	B3	SUPERSCRIPT THREE
180	B4	ACUTE ACCENT
181	B5	MICRO SIGN
182	B6	PILCROW SIGN
183	B7	MIDDLE DOT
184	B8	CEDILLA
185	B9	SUPERSCRIPT ONE
186	BA	MASCULINE ORDINAL INDICATOR
187	BB	RIGHT POINTING DOUBLE ANGLE QUOTATION MARK
188	BC	VULGAR FRACTION ONE QUARTER
189	BD	VULGAR FRACTION ONE HALF
190	BE	VULGAR FRACTION THREE QUARTERS
191	BF	INVERTED QUESTION MARK
192	C0	LATIN CAPITAL LETTER A WITH GRAVE
193	C1	LATIN CAPITAL LETTER A WITH ACUTE
194	C2	LATIN CAPITAL LETTER A WITH CIRCUMFLEX
195	C3	LATIN CAPITAL LETTER A WITH TILDE
196	C4	LATIN CAPITAL LETTER A WITH DIAERESIS
197	C5	LATIN CAPITAL LETTER A WITH RING ABOVE
198	C6	LATIN CAPITAL LIGATURE AE
199	C7	LATIN CAPITAL LETTER C WITH CEDILLA
200	C8	LATIN CAPITAL LETTER E WITH GRAVE
201	C9	LATIN CAPITAL LETTER E WITH ACUTE
202	CA	LATIN CAPITAL LETTER E WITH CIRCUMFLEX
203	CB	LATIN CAPITAL LETTER E WITH DIAERESIS
204	CC	LATIN CAPITAL LETTER I WITH GRAVE
205	CD	LATIN CAPITAL LETTER I WITH ACUTE
206	CE	LATIN CAPITAL LETTER I WITH CIRCUMFLEX
207	CF	LATIN CAPITAL LETTER I WITH DIAERESIS
208	D0	LATIN CAPITAL LETTER ETH (ICELANDIC)
209	D1	LATIN CAPITAL LETTER N WITH TILDE
210	D2	LATIN CAPITAL LETTER O WITH GRAVE
211	D3	LATIN CAPITAL LETTER O WITH ACUTE
212	D4	LATIN CAPITAL LETTER O WITH CIRCUMFLEX
213	D5	LATIN CAPITAL LETTER O WITH TILDE
214	D6	LATIN CAPITAL LETTER O WITH DIAERESIS
215	D7	MULTIPLICATION SIGN

Table C-3-4. Latin Supplement Character Set Explanation (continued)

Decimal	Hex	Name
216	D8	LATIN CAPITAL LETTER O WITH STROKE
217	D9	LATIN CAPITAL LETTER U WITH GRAVE
218	DA	LATIN CAPITAL LETTER U WITH ACUTE
219	DB	LATIN CAPITAL LETTER U WITH CIRCUMFLEX
220	DC	LATIN CAPITAL LETTER U WITH DIAERESIS
221	DD	LATIN CAPITAL LETTER Y WITH ACUTE
222	DE	LATIN CAPITAL LETTER THORN (ICELANDIC)
223	DF	LATIN SMALL LETTER SHARP S (GERMAN)
224	E0	LATIN SMALL LETTER A WITH GRAVE
225	E1	LATIN SMALL LETTER A WITH ACUTE
226	E2	LATIN SMALL LETTER A WITH CIRCUMFLEX
227	E3	LATIN SMALL LETTER A WITH TILDE
228	E4	LATIN SMALL LETTER A WITH DIAERESIS
229	E5	LATIN SMALL LETTER A WITH RING ABOVE
230	E6	LATIN SMALL LIGATURE AE
231	E7	LATIN SMALL LETTER C WITH CEDILLA
232	E8	LATIN SMALL LETTER E WITH GRAVE
233	E9	LATIN SMALL LETTER E WITH ACUTE
234	EA	LATIN SMALL LETTER E WITH CIRCUMFLEX
235	EB	LATIN SMALL LETTER E WITH DIAERESIS
236	EC	LATIN SMALL LETTER I WITH GRAVE
237	ED	LATIN SMALL LETTER I WITH ACUTE
238	EE	LATIN SMALL LETTER I WITH CIRCUMFLEX
239	EF	LATIN SMALL LETTER I WITH DIAERESIS
240	F0	LATIN SMALL LETTER ETH (ICELANDIC)
241	F1	LATIN SMALL LETTER N WITH TILDE
242	F2	LATIN SMALL LETTER O WITH GRAVE
243	F3	LATIN SMALL LETTER O WITH ACUTE
244	F4	LATIN SMALL LETTER O WITH CIRCUMFLEX
245	F5	LATIN SMALL LETTER O WITH TILDE
246	F6	LATIN SMALL LETTER O WITH DIAERESIS
247	F7	DIVISION SIGN
248	F8	LATIN SMALL LETTER O WITH STROKE
249	F9	LATIN SMALL LETTER U WITH GRAVE
250	FA	LATIN SMALL LETTER U WITH ACUTE
251	FB	LATIN SMALL LETTER U WITH CIRCUMFLEX
252	FC	LATIN SMALL LETTER U WITH DIAERESIS
253	FD	LATIN SMALL LETTER Y WITH ACUTE
254	FE	LATIN SMALL LETTER THORN (ICELANDIC)
255	FF	LATIN SMALL LETTER Y WITH DIAERESIS

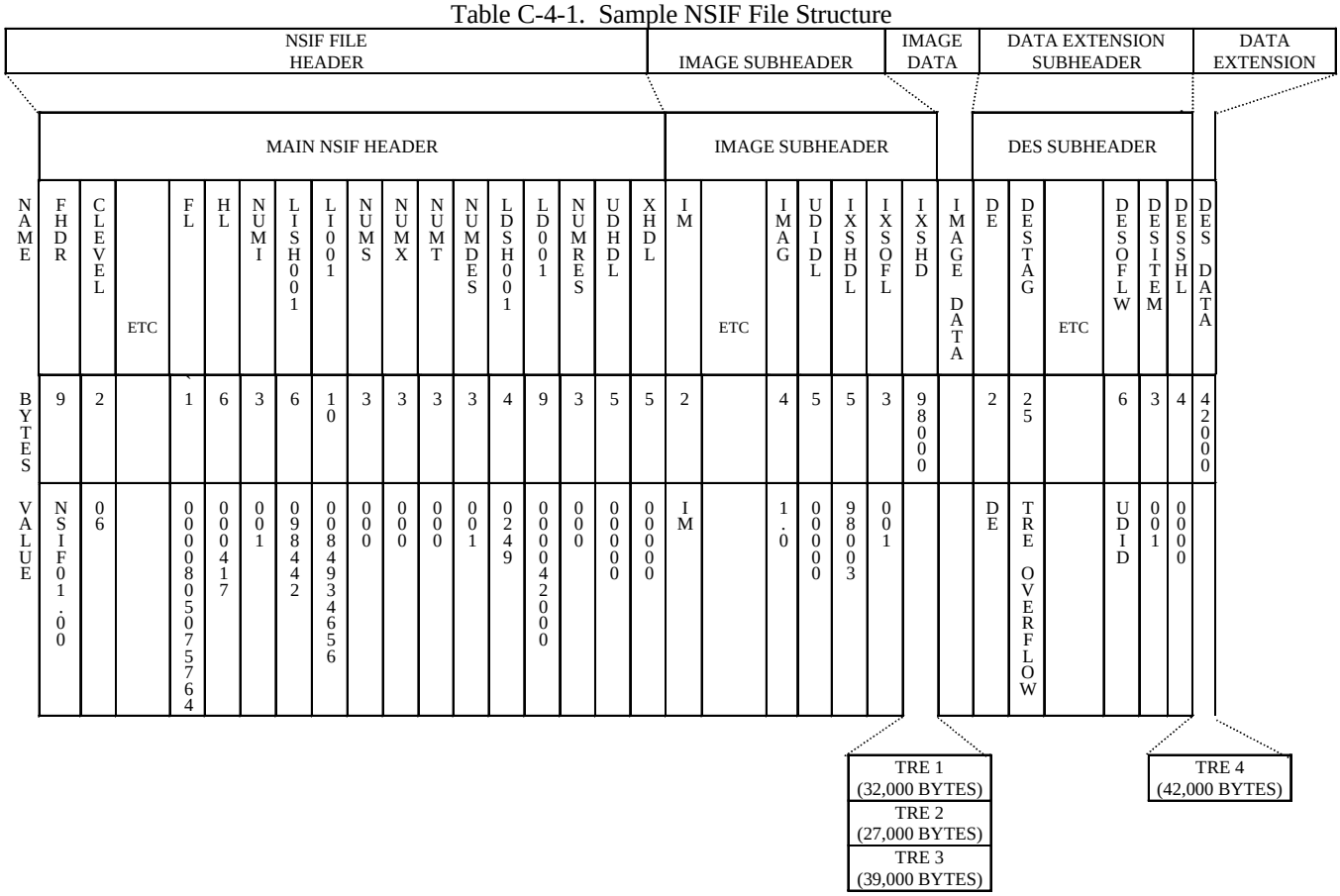
10. File System Constraints. A NSIF File is presented as a stream of contiguous bytes. This format may not be suitable for some file systems. The translation of NSIF Files to and from the local file format for a system should be examined for potential incompatibilities before an implementation is attempted.

11. Security Considerations. A NSIF File contains sufficient security information in the NSIF File Header, Image and Graphic Subheaders to allow implementors to meet virtually any security requirement for displaying classification data. Exact security information handling requirements generally are specified by appropriate accreditation authorities or specific user requirements. It is suggested that implementors extract the classification data from one or more of the Header/Subheaders and ensure that the information is always displayed whenever the pertinent part of the NSIF File is displayed.

APPENDIX 4 TO ANNEX C. SAMPLE NSIF FILE STRUCTURE

The following is an example of handling a NSIF File that has control TREs with overflow. The NSIF File has a single image.

Table C-4-1. Sample NSIF File Structure



Note: Capacity of IXSHD is 99,999 bytes, you cannot split a TRE, therefore the first 3 TREs fit into the IXSHD field and the 4th TRE is overflowed into the Data Extension Area.

APPENDIX 5 TO ANNEX C. PRODUCT CONFIGURATIONS

INTRODUCTION

This appendix contains general or explanatory information that may be helpful, but is not mandatory.

1. General. The NSIF provides a very flexible means to package imagery products. One of the main objectives of NSIF is to provide increased interoperability among potentially disparate imagery systems. For the purposes of NSIF, interoperability is defined as the ability to exchange NSIF formatted imagery products among NSIF capable systems in a manner that is meaningful and useful to the end users. This places a significant burden on NSIF read capable implementations to be able to interpret and use potentially any combination of NSIF File format options that may be created by NSIF File producers. Consequently, significant care should be taken when defining product specifications for NSIF formatted imagery products.

2. Purpose. The objective of the following discussion is to describe several generalised product configurations that can be used as the basis for defining specific imagery products. These product configurations are typical of those successfully used within the imagery and mapping community to date.

NSIF PRODUCT CONFIGURATIONS

3. General. An imagery product may potentially be produced under one of the following concepts:

a. Single NSIF File, Single Base Image. This is the most common use of the NSIF format. In this product concept, the NSIF File is produced with a focus on a single image, commonly called the base image. All other Segments and extended data within the NSIF File are focused on amplifying the information portrayed in the base image.

b. Single NSIF File, Multiple Images. In this product concept, the NSIF File is produced containing multiple images, all of which have equal or similar significance to the value of the product. Other Segments and extended data within the NSIF File are focused on amplifying the information portrayed in the image(s) to which they are associated.

c. Single NSIF File, No Image. This type of product may only have GSs, or only TS, or only Extension Segments, or any combination of these Segments. The significance of the data within the NSIF File may pertain only to that NSIF File, or it may pertain to one or more NSIF Files with which it is associated.

d. Multiple Correlated NSIF Files. For this product concept, the product is comprised of multiple NSIF Files that are interrelated as explicitly defined in the product specification.

4. Single NSIF File, Single Base Image. For this type of product NSIF File, there is one image of central focus, the base image, placed on the CCS plane. Its first pixel may be located at the origin (0,0) of the CCS, or off-set from the CCS origin according to the row/column coordinate values placed in the Location (LOC) field of the Image Subheader (ILOC field). Figure C-5-1 provides a representative portrayal for the following discussion.

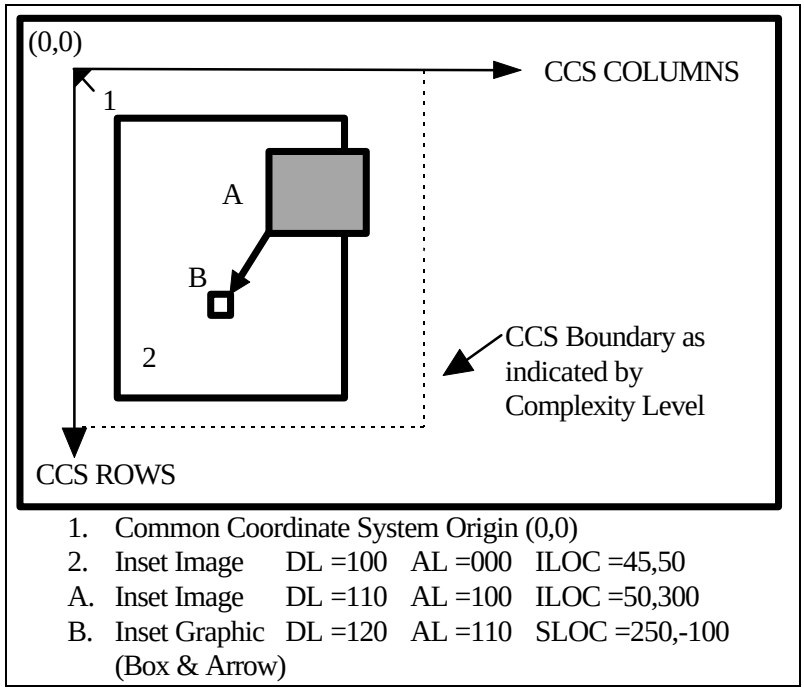


Figure C-5-1. Single NSIF File, Single Base Image

a. Image Segment (IS) Overlays. Additional images, often called subimages or inset images, may be included as separate ISs in the NSIF File. The purpose of these images is to add information or clarity about the base image. Their placement in the CCS plane is controlled by the value of each Segment's ALVL and LOC row/column value. When overlay images are attached to the base image, the LOC value represents a row/column off-set in the CCS from the location specified by the base image row/column LOC value. If the overlay image is unattached to any other Segment (ALVL000), the overlay's LOC value is a row/column off-set from the CCS origin (0,0).

b. Graphic Segment (GS) Overlays. GS are used to provide graphical (lines, polygons, ellipses, etc.) and textual annotation to the base image. The graphic representation is done using CGM. In a manner similar to IS overlays, the placement of graphics in the CCS plane is controlled by the value of each Segment's ALVL and LOC value. CGM has its own internal Cartesian coordinate space called Virtual Display Coordinates (VDC) that has its own defined origin (0,0) point. The row/column value in the GS LOC field (SLOC field) identifies the placement of the graphic's VDC origin point relative to the CCS origin when ALVL is equal to 000, or relative to the Segment LOC to which it is attached.

c. Non-Destructive Overlays. NSIF IS and GS overlays are handled in a non-destructive manner. The overlays may be placed anywhere within the bounds of the CCS (defined for a specific NSIF File by the CLEVEL field). They may be placed totally on the base image, partially on the base image, or entirely off of the base image. Any IS or GS can be placed on or under any other Segment, fully or partially. The visibility of pixel values of overlapping Segments is determined by the DLVL assigned to that Segment. Each displayable Segment (images and graphics) is assigned a DLVL (ranging from 001 to 999) that is unique within the NSIF File. At any CCS pixel location shared by more than one image or graphic, the visible pixel value is the one from the Segment having the greatest DLVL value. If the user of a NSIF File opts to move an overlay, or turn off the presentation of an overlay, the next greatest underlying pixel value(s) will then become visible. This approach allows for the non-destructible nature of NSIF overlays as opposed to the 'burned in' approach where overlay pixel values are used to replace pixels values of the underlying image.

d. Text Segments (TS). TSs allow inclusion in the NSIF File of textual information related to the base image, perhaps a textual description of the activities portrayed in the image.

e. Extension Data. The NSIF File Header and each standard data type Subheader have designated expandable fields to allow for the optional inclusion of Extension Data. The inclusion of Extension Data provides the ability to add data/information about the standard data type (metadata) that is not contained in the basic fields of the Headers and Subheaders. The additional data is contained within one or more NSIF TREs that are placed in the appropriate field (user-defined Data Field or extended Data Field) of the standard data type Subheader for which the metadata applies. When TREs have application across multiple data types in the NSIF File, or otherwise apply to the entire NSIF File in general, they are placed in the appropriate NSIF File Header Fields. Whereas general purpose NSIF readers should always be able to portray IS and GS and act on Standard Header and Subheader Data, they may not always be able to act on product specific Extension Data. Upon receipt of a NSIF File that contains Extension Data, a NSIF compliant system should at least ignore the extensions and properly interpret the other legal components of the NSIF File. Exemplary use of TREs:

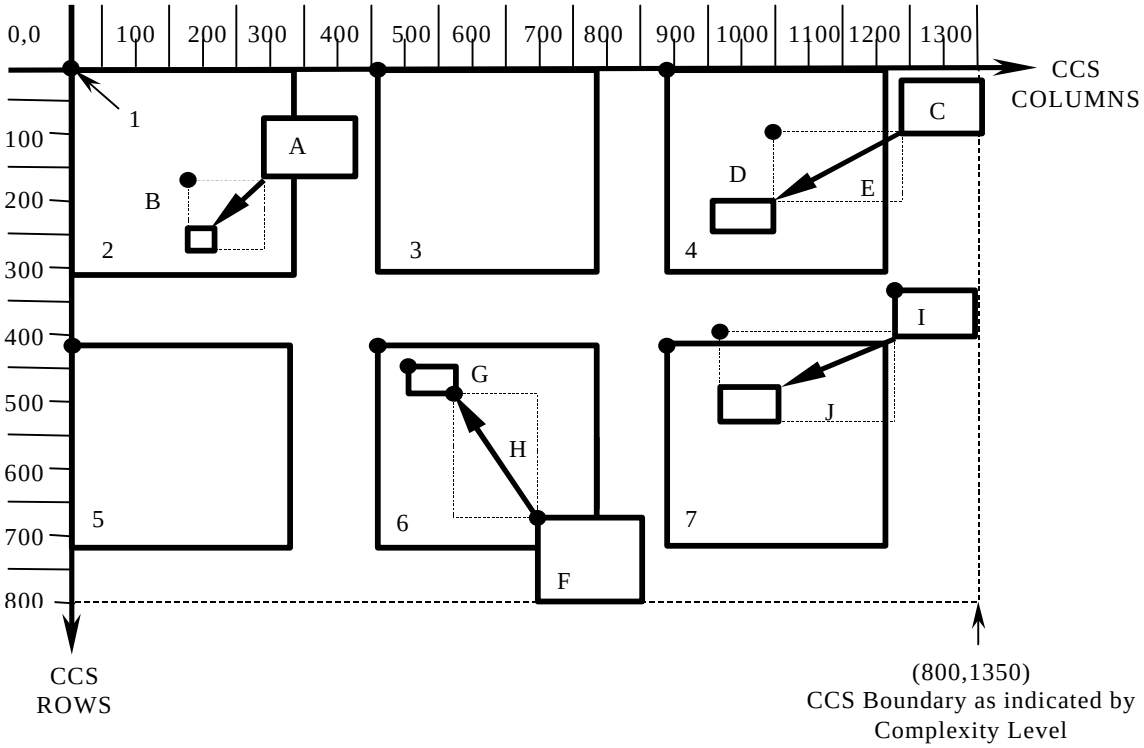
(1) Data about people, buildings, places, landmarks, equipment or other objects that may appear in the image.

(2) Data to allow correlation of information among multiple images and annotations within a NSIF File.

(3) Data about the equipment settings used to obtain the digital image, XRAY, etc.

(4) Data to allow geo-positioning of images or measurement of distances of objects in the images.

5. Single NSIF File, Multiple Images. For this type of product NSIF File, multiple images of equal or similar focus (multiple ‘base’ images) are placed within the CCS plane. Each image is located at an off-set from the CCS origin such that there is no overlap among the images. The CLEVEL of the NSIF File must be chosen such that the bounds of the CCS for the NSIF File are sufficient to contain the extent of all Segments within the NSIF File. Figure C-5-2 provides a representative portrayal for this product type. NSIF packer application users need to be aware that the ILOC field may not be large enough to place unattached images everywhere in the CCS. However, attached images can be positioned over the entire CCS.



	DISPLAY LEVEL	ATTACHMENT LEVEL	LOCATION
1. Common Coordinate System Origin (0,0)			
2. Image	DLVL=100	ALVL=000	50, 50
(A) Image Segment Overlay	DLVL=110	ALVL=100	70, 250
(B) Graphic Overlay (CGM Rectangle & Arrow)	DLVL=120	ALVL=110	100, -125
3. Image	DLVL=200	ALVL=000	50, 450
4. Image	DLVL=300	ALVL=000	50, 800
(C) Image Segment Overlay	DLVL=310	ALVL=300	50, 300
(D) Graphic Segment Overlay (CGM Rectangle	DLVL=320	ALVL=300	200, 25
(E) Graphic Segment Overlay (CGM Arrow)	DLVL=330	ALVL=300	100, 150
5. Image	DLVL=400	ALVL=000	450, 50
6. Image	DLVL=500	ALVL=000	450, 450
(F) Image Segment Overlay	DLVL=510	ALVL=500	250, 200
(G) Graphic Segment Overlay (CGM Rectangle)	DLVL=520	ALVL=500	50, 40
(H) Graphic Segment Overlay (CGM Arrow)	DLVL=530	ALVL=500	90, 100
7. Image	DLVL=600	ALVL=000	-100, 300
(I) Image Segment Overlay	DLVL=610	ALVL=600	-100, 300
(J) CGM Graphic Overlay (Rectangle & Arrow)	DLVL=620	ALVL=600	-25, 100

Figure C-5-2. Single NSIF File, Multiple Images

a. Overlays. Each image may be overlaid with additional IS and GS in the same fashion as described for the single NSIF File, single image case above. All overlays associated with a specific image should be attached to that specific image. DLVLs assigned to each image and graphic in the NSIF File must be unique within the NSIF File.

b. Text Segments (TS). Each TS should be clearly marked as to whether it applies to the NSIF File as a whole, or if it is associated with specific images within the NSIF File.

c. Extension Data. TREs are placed in the NSIF File Header Extension Fields when applicable to the NSIF File as a whole. Extensions specific to a Segment are placed in that Segment's Subheader.

6. Single NSIF File, No Image. A single NSIF File product does not always contain an image. It could contain one or more GS, one or more TSs, one or more Extension Segments, or any combination of these non-IS. The NSIF File may be useful as a stand alone product, or it may be intended for use in conjunction with other NSIF Files. For example, the NSIF File could contain graphic overlays to be merged with or applied to another NSIF File that was pre-positioned or transmitted at an earlier time. Any general purpose NSIF reader should at least be able to interpret and render the standard Segments of no image NSIF Files on a stand alone basis.

7. Multiple Correlated NSIF Files. An imagery product may be comprised of multiple NSIF Files that are interrelated in a specified manner. This approach vastly increases the potential combination and permutation of options a general purpose NSIF reader would need to support to maintain full interpret capability. Therefore, each NSIF File in a multiple correlated NSIF File set must be structured such that a general purpose NSIF reader can properly interpret and render the NSIF File as if it were a stand alone product. The correlation of multiple NSIF Files in a single product must be explicitly and unambiguously defined in a product specification. NSIF readers can then be further categorised according to specific multiple NSIF File product specifications that are supported. Representative use of multiple correlated NSIF Files includes:

a. Stereo Imagery. Some stereo image products are comprised of separate NSIF Files for the stereo components of each image scene.

b. Imagery Mosaics. Some extremely large image and map products consist of multiple NSIF Files structured such that they can be pieced together in mosaic fashion by the interpret application as if the multiple NSIF Files were a single larger image.

c. Reduced Resolution Data Sets (Rsets). Redeced Resolution Data Set (Rset) products are comprised of multiple NSIF Files. One NSIF File contains a full resolution image and the other NSIF Files contain the same image in a variety of lower resolutions.

d. Imagery and Maps. Geo-positioning products exist which consist of multiple separate NSIF Files containing interrelated maps, images, graphics, legends, product indices, and geo-reference data.

ANNEX D. STANDARD GEOSPATIAL SUPPORT DATA EXTENSIONS

1. General. That set of support data needed to accomplish the mission of a system receiving a NSIF File is referred to as appropriate support data. The appropriate support data may vary across systems receiving NSIF Files. A system receiving a NSIF File may add or subtract support data before passing the file to another system with a different mission. This strategy implies a modular support data definition approach.

Image and raster map providers produce NSIF Files with support data from other formats which also contain support information. Table D-1 contains the CEs that define the format for the support information required within a NSIF File that contains geo-referenced image, matrix, or raster map data. The CEs are defined in STANAG 7074, Digital Geographic Information Exchange Standard (DIGEST) - AGeoP-3A, Part 2, Annex D. The TREs incorporate all SDEs relevant to geo-referenced image, matrix, or raster map data. Systems using DIGEST imagery, matrix, or raster map data formatted according to NSIF should be designed to extract the needed data from the TRE described in DIGEST. The categories of image and extensive digital geographic information are shown in DIGEST.

Table D-1. Geospatial Support Data Extensions (GEOSDE)

SDE IDENTIFIER	NAME	DIGEST REFERENCE
GEOPS	Geo Positioning Information Extension	Part 2, Annex D, Table D-8
GRDPS	Grid Reference Data Extension	Part 2, Annex D, Table D-9
GEOLO	Local Geographic Coordinate System Extension	Part 2, Annex D, Table D-10
MAPLO	Local Cartographic (Grid-Based) Coordinate System Extension	Part 2, Annex D, Table D-11
REGPT	Registration Point Extension	Part 2, Annex D, Table D-12
ACCPO	Positional Accuracy Extension	Part 2, Annex D, Table D-13
ACCHZ	Horizontal Accuracy Extension	Part 2, Annex D, Table D-14
ACCVT	Vertical Accuracy Extension	Part 2, Annex D, Table D-15
SOURC	Map Source Description Extension	Part 2, Annex D, Table D-16
SNSPS	Sensor Parameters Data Extension	Part 2, Annex D, Table D-17

ANNEX E. COMPLEXITY LEVELS (CLEVELs)

The following Table provides a summary of the NSIF 01.00 CLEVELs.

Table E-1. NSIF 01.00 Complexity Levels (CLEVELs)

Complexity Level	3	5	6	7
Common Coordinate System Extent (Pixels)	(000000, 000000) to (002047, 002047)	(000000, 000000) to (008191, 008191)	(000000, 000000) to (065535, 065535)	(000000, 000000) to (Unbounded)
File Size	Max File Size: 50 Mbyte	Max File Size: 1 Gbyte	Max File Size: 2 Gbyte -1 byte	Max File Size: 10Gbyte -1 byte
Image Size Image(s) placed within CCS extent	000002 to 002048 Rows X 000002 to 002048 Cols (R and C ≤ 2048)	000002 to 008192 Rows X 000002 to 008191 Cols (R and/or C > 2048)	000002 to 065536 Rows X 000002 to 065536 Cols (R and/or C > 8192)	000002 to unbounded x 000002 to unbounded (R and/or C > 65536)
Image Blocking Square and Rectangular Blocks allowed	Single and Multiple Blocks 0002 to 2048 V X 0002 to 2048 H	Single and Multiple Blocks 0002 to 8192 V X 0002 to 8192 H	Multiple Blocks 0002 to 8192 V X 0002 to 8192 H	
Monochrome (MONO) No Compression	Single Band 1, 8, 12, 16, 32, 64 Bits per Pixel (NBPP) with and without LUT IC = NC, NM IMODE = B			
Colour 8-Bit (RGB / LUT) No Compression	Single Band 8-Bits per Pixel (NBPP) with LUT IC = NC, NM IMODE = B			
Colour 24 Bit (RGB) No Compression	Three Band 8-Bits per Pixel (NBPP) no LUT IC = NC, NM IMODE = B, P, R, S			
Multispectral No Compression	3 to 8 Bands	3 to 256 Bands, 8, 16, 32, 64-Bits per Pixel per Band with and without LUT in each Band IMODE = B, P, R, S		3 ≤ 9999 Bands
JPEG DCT Compression Monochrome (MONO)	Single Band 8 and 12-Bit Sample no LUT IC = C3, M3 IMODE = B			
JPEG DCT Compression Colour 24-Bit (RGB)	Three Bands 8-Bit Sample per Band no LUT IC = C3, M3 IMODE = P			
JPEG Compression Colour 24-Bit (YCbCr601)	Three Bands 8-Bit Sample per Band no LUT IC = C3, M3 IMODE = P			
Downsample JPEG (NIMA Method 4) Monochrome (MONO)	Single Band Single Block Only 8-Bit Sample no LUT IC = I1 IMODE = B (Image size may not exceed 2048 Pixels H and/or V			
JPEG Lossless Compression	TBD			
Bi-Level Compression COMRAT = 1D, 2DS, 2DH	Single Band 1-Bit per Pixel with and without LUT IC = C1, M1 IMODE = B		Not applicable as basis for CLEVEL, however, may be included as an overlay.	

Table E-1. NSIF 01.00 Complexity Levels (CLEVELs) (continued)

Complexity Level	3	5	6	7
VQ Compression	Single Band 8-Bits per Pixel 4 x 4 Kernel 4 Tables IC = C4, M4			
VQ Monochrome	with or without LUT IMODE = B			
VQ 8-Bit Colour	with LUT IMODE = B			
Multispectral Compressed	TBD			
NON-IMAGE Elevation Matrix	TBD			
NON-IMAGE Other	TBD			
Number of Images Per File	0 to 20	0 to 100		
Number of CGM Symbol Segments Per File	0 to 100			
Aggregate Size of Symbol Segments	1 Mbyte maximum	5 Mbyte maximum		
Symbol Profile	Symbology and Annotation for Maps and Imagery (SAMI)			
Number of Text Segments Per File	0 to 32 Segments			
Text Format Codes Supported	STA, MTF, UC2, UT1			
Text Data Per Segment	0 to 99999 Characters			
Tagged Record Extensions (TREs)				
Data Extension Segments (DESs)	Only defined DES in TRE_OVERFLOW			
Currently Registered DESs	TRE_OVERFLOW	TRE_OVERFLOW	TRE_OVERFLOW	TRE_OVERFLOW
Reserved Extension Segments	none			